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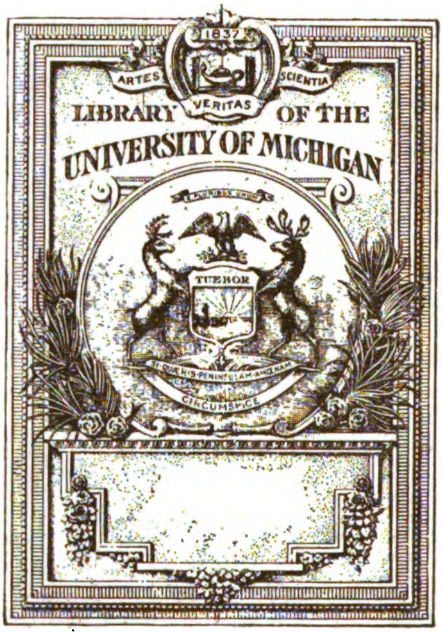

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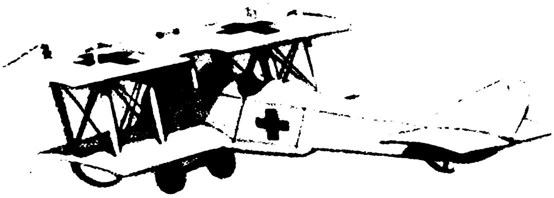

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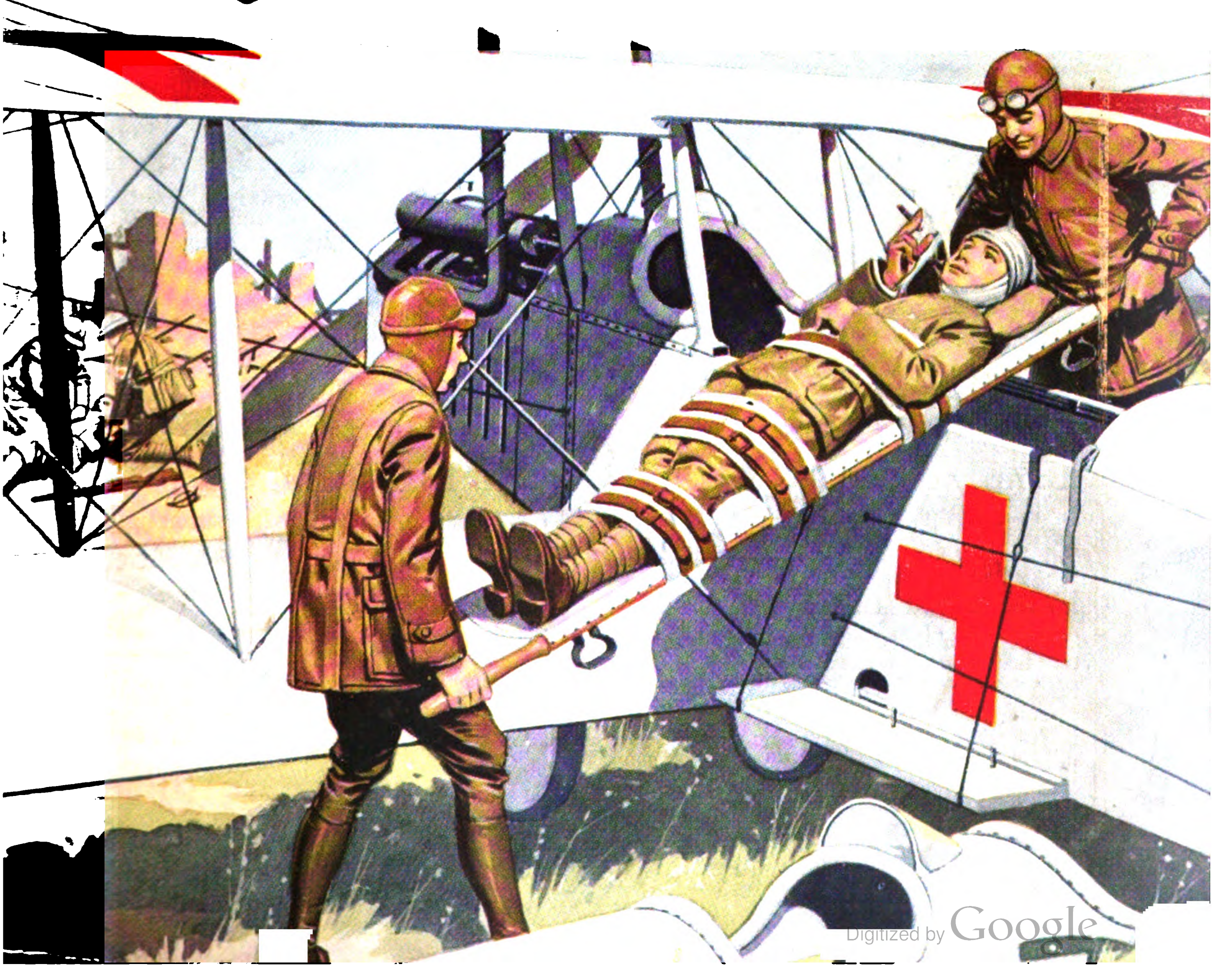

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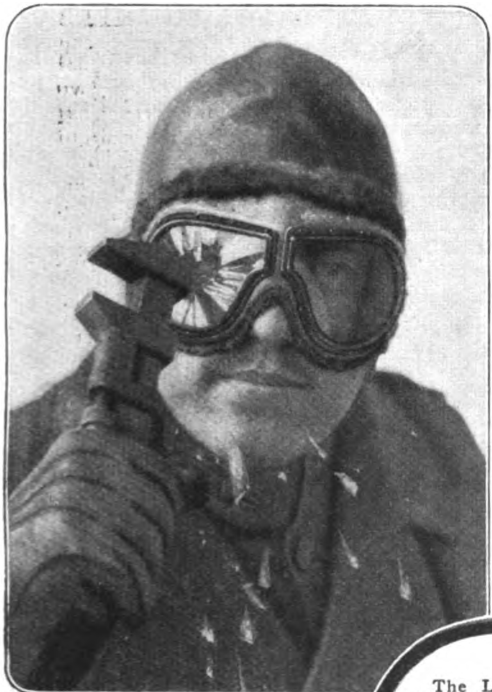
Remarkable Safety Goggle for Flying Men

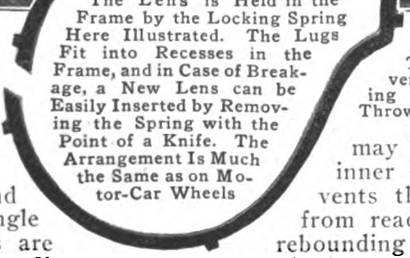
OF much interest and considerable importance in the aeronautic world is the invention of a distinctly new type of safety goggle that possesses remarkable qualities of great advantage to airmen.

One of the outstanding features is that each of the two lenses is formed of one optically plane piece of glass which has no distorting or prismatic effect. Furthermore the position of the lenses and their shape give a visual angle of 170°. These two points are of inestimable value to a flier, especially when landing and in scouting.



This Unquestionably Is the Most Spectacular and Convincing Test of a Safety Goggle That could be Made. The Lens is Shattered, but the Protective Shield Screens the Eye

No Glass Enters the Demonstrator's Right Eye. The Protective Shield Prevents the Splinters from Passing through the Goggle and Throws Them Outward



The Lens is Held in the Frame by the Locking Spring Here Illustrated. The Lugs Fit into Recesses in the Frame, and in Case of Breakage, a New Lens can be Easily Inserted by Removing the Spring with the Point of a Knife. The Arrangement Is Much the Same as on Motor-Car Wheels

Each lens is backed by a transparent shield made of a secret material that has great strength and resilience. The former is only .081 in. thick and the latter .021 in. Between the two is an air space. Here lies the spectacular phase of the invention. While the goggle is being worn, either of the lenses may be struck a heavy blow with a wrench or cold chisel. The lens may be shattered, but the inner shield not only prevents the particles of glass from reaching the eye, but in rebounding hurls them outward and also stops the progress of the instrument. In this connection it is interesting to note that the shield has a tensile strength of from 8,000 to 12,000 lb. to the square inch. The air space between the lens and the shield prevents the clouding of the glass at high altitudes.

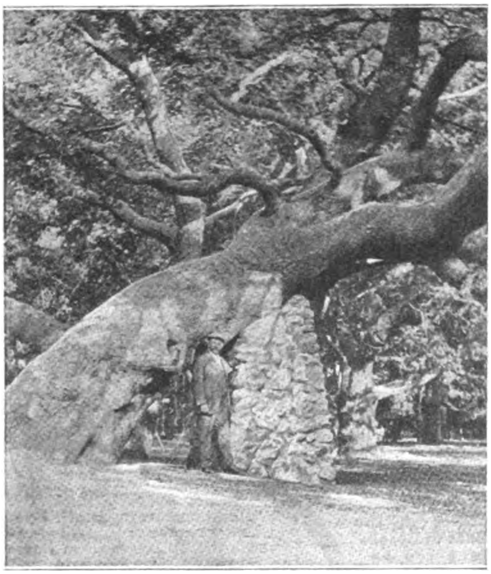
The lenses are mounted in angular positions in holders and made fast by spring locks similar in principle to those used on motor-car wheels. This arrangement makes the goggle streamline, so that air resistance is reduced and rain drops are prevented from accumulating on the outer surface. Ventilation is obtained through adjustable openings provided at the top and bottom of each eye compartment. The air enters in such a manner that no direct current can strike either of the eyes. Furthermore, the edges of the goggle are beveled, shaped to fit the face, and trimmed with fur so that air cannot enter except through the ports.

Shocks and jolts received in landing frequently throw a pilot against the cowl of his machine and on many occasions have resulted thereby in broken goggles. For this and other apparent reasons, an ordinary goggle is dangerous.

Other nonbreakable goggle lenses, consisting of alternate layers of glass, cement, and celluloid, have been made. Obviously, however, such a combination not only keeps out much light, but may have a distorting effect. The value of the new goggle therefore must be patent even to a layman.

STONE PIER KEEPS BIG OAK FROM FALLING

In a beautiful park in Orange County, Calif., special precautions have been taken to preserve an immense live oak which was threatened with destruction by falling. The tree, with branches having a spread of fully 125 ft., leans far to one side, and because of its great weight was likely to be uprooted until the park authorities built a strong pier of masonry to support the inclined trunk. Upheld by the pier, the tree promises to continue to thrive for many years. The support is about 7 ft. high and nearly as broad at the base.



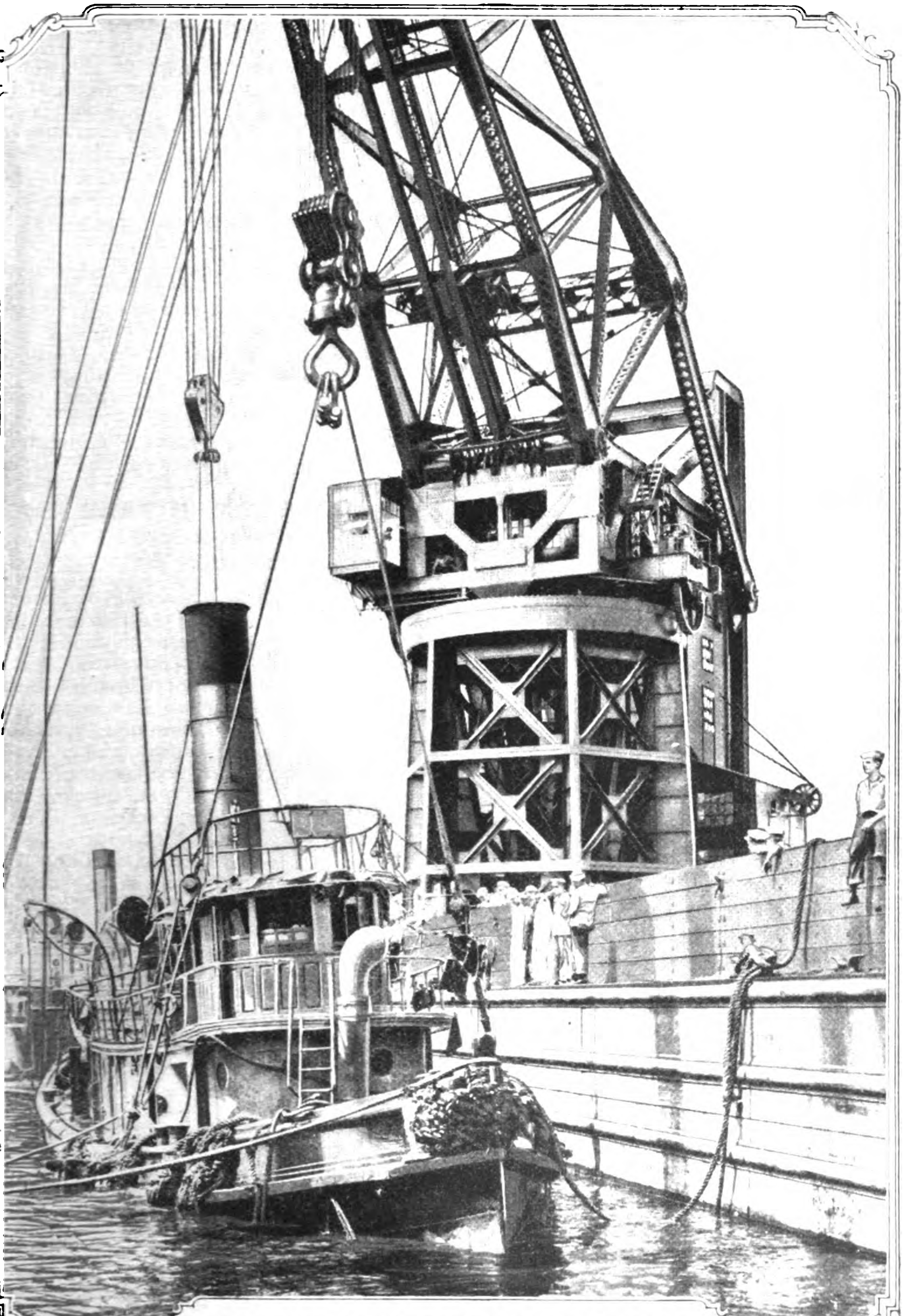
Huge Live Oak in Orange County, California Park, Which is Kept from Falling by a Stone Pier Built under the Inclined Trunk

MINIATURE EDITION IN PAPER HAS NEWS FOR SOLDIERS

A Denver daily paper has been furnishing its readers with an original and attractive means of supplying news items to friends and relatives overseas. In each issue a space about four inches square is set aside as a miniature overseas edition of the paper, with its own date line, volume, number, etc. Here are printed brevities which give the reader a summary of the day's most interesting happenings, at a glance. It is intended that this section be cut out and inclosed with letters sent to men in the service.

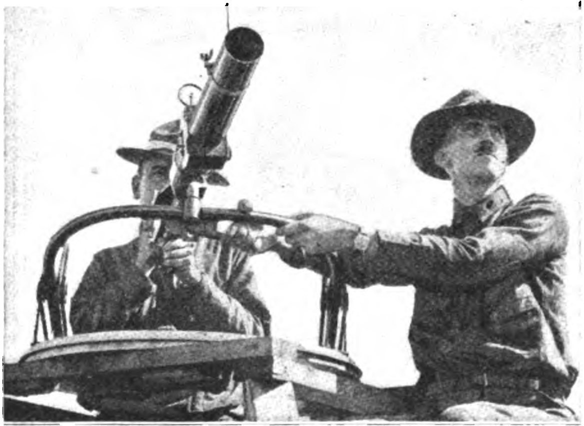
BIG FLOATING CRANE RAISES TUG FROM HARBOR BOTTOM

One of the tasks recently assigned to a giant floating crane that bears the reputation of being the largest of its kind in the country, was the raising of the navy tug "Massasoit," which sank in one of our harbors not long ago. The feat, of little importance in itself, illustrates most strikingly the capacity of the crane, which is mounted on a pontoon, 140 ft. long and 85 ft. wide. Cables were passed beneath the hull of the sunken vessel by divers and then attached to the hoist hooks. With almost as much ease as if it had been raising a foundered rowboat, the crane lifted the heavy submerged tug from the harbor. Incidentally it is interesting to note that when the crane's jib is raised to its full height, it reaches a point 200 ft. above the level of the water. The crane is driven electrically by current generated aboard, and is controlled by one man. It automatically locks if the current is interrupted.



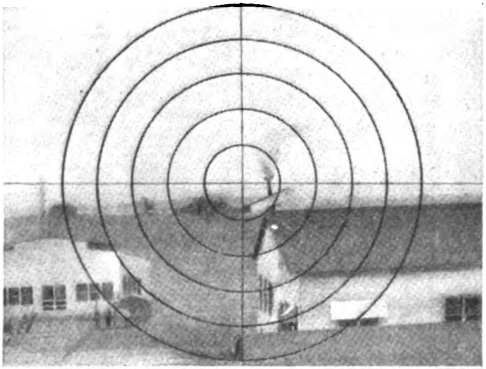
After Divers had Placed Stanch Steel Ropes beneath the Sunken Tug, the Powerful Crane Lifted the Boat from the Harbor Bottom without Apparent Effort. The Photograph **Shows the Dripping Vessel Held at the Surface in Its Cable Sling, Ready for the Water to be Pumped from Its Hull**

CAMERA GUN CATCHES BIPLANE IN DREADED TAIL SPIN

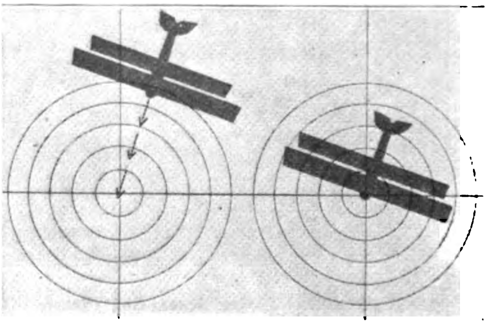


The Camera Gun, Shown in Use Above, Enables a Student in Aerial Gunnery to Practice Firing at Speeding Aeroplanes. The Instrument, Instead of Hurling Bullets, Takes Pictures That Check the Gunner's Marksmanship

Two things about which questions are often asked by those interested in, but unfamiliar with, military aeronautics, are the famous tail spin—the cause of many fatalities—and the ring-sight camera gun used in training aerial fighters. Quite singularly, both of these subjects are treated in one of the illustrations herewith. The picture, taken with a camera gun, shows a training plane falling in a tail spin, or, more correctly, out of one. It ended in a crash that seriously injured, although it did not kill, the pilot. The machine was serving as a target for a student gunner stationed on the roof of a hangar, when, swerving to avoid a water tank, it slipped into a tail spin. The gunner shifted his sight to take a direct picture, rather than to register a hit, and caught the craft just before it took its final plunge. Had the exposure been made an instant sooner it would have shown the plane side to and nosed down at an angle of about 60°. It also would have been to the left and slightly above the position in which it is shown. The photograph pictures the tail of the machine in an almost vertical position. In a tail spin proper, however, the nose descends in a very tight, steep spiral, while the tail whips about in a wide circle, thus presenting an appearance somewhat like that of a maple seed falling through the air. The targetlike rings and bisection lines visible in the picture are produced by a screen in the camera gun and are for the purpose of checking hits. In this particular case, to have registered a hit, the plane should be shown entering the outer circle at the top, with its axis cutting the intersection of the two straight lines. The position of the image in relation to the rings indicates the gunner's judgment in "leading" his target.



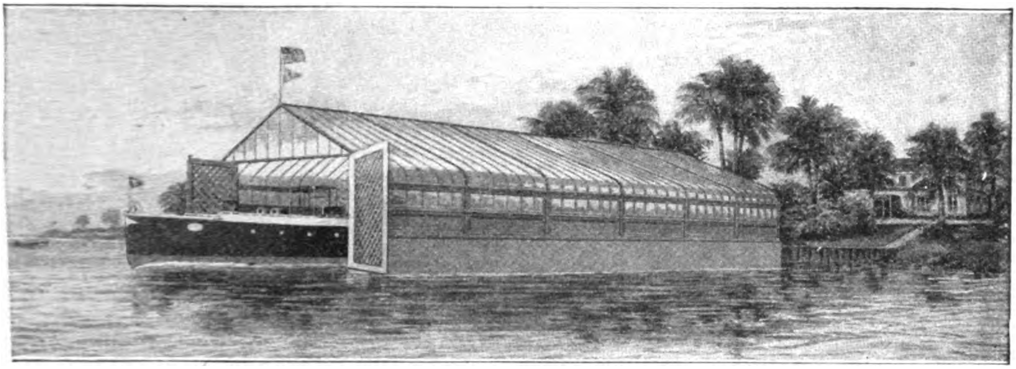
Within the Center Ring Is the Image of the Falling Aeroplane. The Craft is Taking Its Final Plunge after Slipping into the Fatal Tail Spin. The Picture does Not Register a Hit



The Picture at the Left Registers a Hit, and the One at the Right a Miss. This Is Due to the Facts That a Gunner must "Lead" His Target, and That Speed, Direction, and Foreshortening must be Considered

COKE CAN BE MADE FROM COAL FORMERLY THOUGHT UNFIT

At a recent meeting of French scientists it was pointed out that coke could be produced from kinds of coal which hitherto has been considered unsuited for such use. As a rule, coke is made by mixing two kinds of coal, one rather poor in volatile matters and the other over-rich. Now the claim is made that coal too rich in volatile matters to be useful in making coke can be utilized for that purpose if a pro-



Glass Boathouses Are Sufficiently Unusual to be Termed Rare. Anyway, This One, being Built at Miami, Florida, has Attracted Considerable Local Comment

portion of the volatile substances is first removed by subjecting it to predistillation at a certain temperature.

IRELAND'S COAL AND LIGNITE FIELDS TO BE EXPLOITED

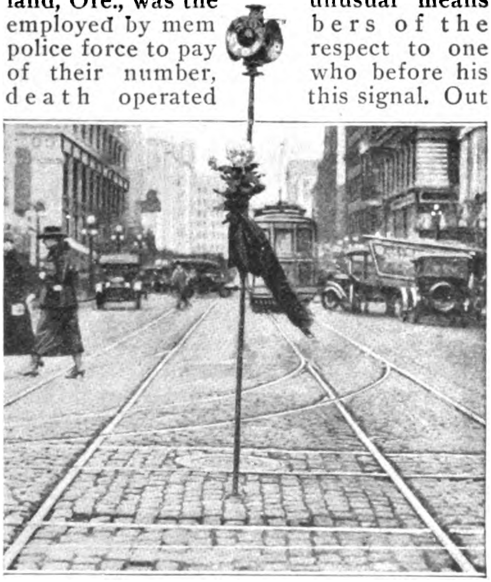
Great Britain's fuel shortage has caused attention to be directed to certain of the potential coal resources of Ireland with a view to their immediate commercial exploitation. Operations are about to be commenced in County Tyrone and borings will be made at Coalisland and in the district between there and Lough Neagh. It is said that some of the Coalisland seams are known to be of good quality, but the present operations in the country along the way to Lough Neagh are to be for the purpose of determining the existence of coal in paying quantities. Lignite abounds in the region and its utilization is to be undertaken at once. It is to be stripped from its bed by rotary cutters, processed, and pressed into briquettes. The secret treatment to be employed is said to make lignite a good coal substitute. The machinery now being installed will be capable of producing perhaps 15,000 tons of briquettes weekly.

GLASS BOATHOUSE IS DESIGNED FOR NEW YORKER'S YACHT

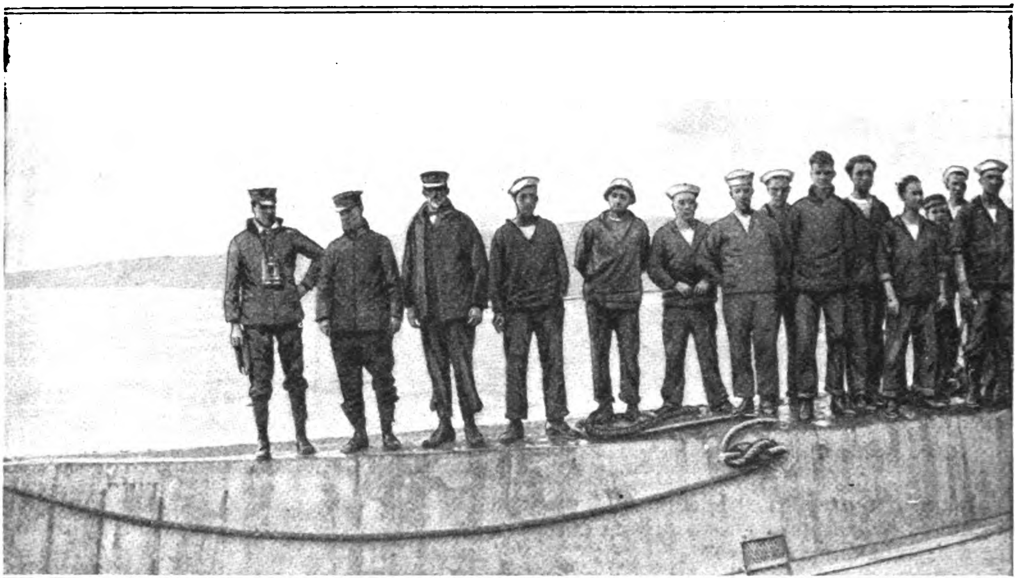
Lace curtains, wall decorations, and phonographs are among the properties classed as essential for well-equipped modern cow sheds, but an aquatic conservatory for a full-grown yacht is quite another thing. Such a structure, however, is being built adjacent to a New Yorker's winter home at Miami, Fla. It is constructed throughout of steel and glass and rests on a concrete foundation. Lattice doors at the ends assure proper ventilation, while the abundant light admitted largely obviates the chances of mildew forming. In designing the glass boathouse, the architects attempted, while providing a shelter, to approximate conditions that obtain when a boat normally rides at anchor.

CREPE ON SEMAPHORE HONORS DEAD TRAFFIC OFFICER

The hanging of crêpe and a spray of flowers on a crossing semaphore in Portland, Ore., was the unusual means employed by members of the police force to pay respect to one of their number, who before his death operated this signal. Out of regard for the man who died, traffic paused an instant as it came to the street intersection where the crêpe hung.



Traffic Semaphore in Portland, Oregon, Hung with Crêpe Out of Respect for the Police Officer, Formerly Stationed at This Crossing, Who had Died



FROM INTERNATIONAL FILM SERVICE

Submarine against Submarine in the North Sea has been a Gambling Game with Greater Odds against the Waters Where, until the Conclusion of Hostilities, They

UNSUNG HEROES

VII—The Submarine Fighter

BY E. T. BRONSDON

The text of this article and the photographs have been passed by the Chief Military Censor.

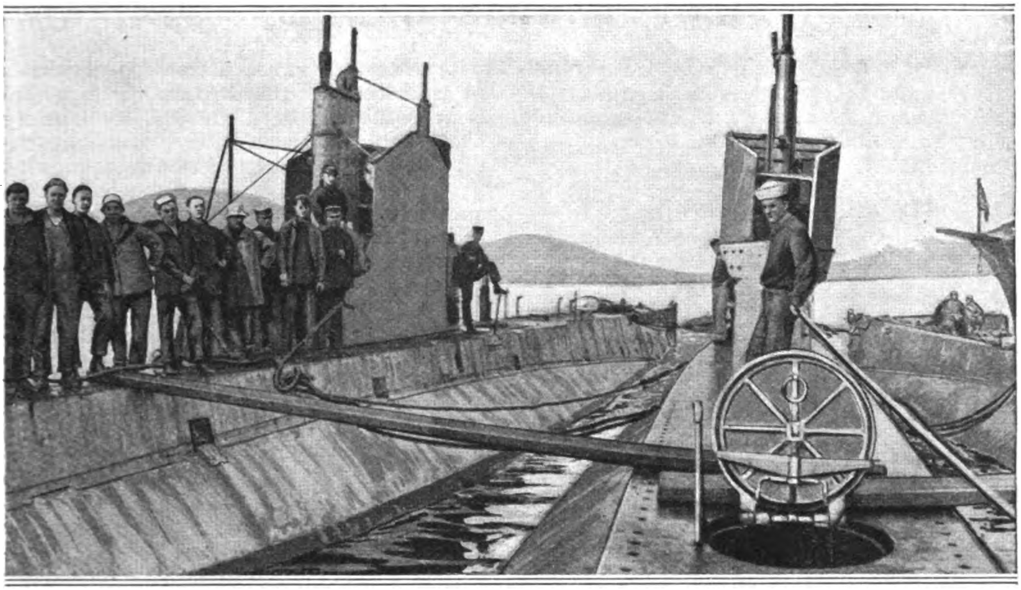
"AT 4:12 p. m., sighted a small cargo carrier near lightship. Shortly after we passed her, sounds of shelling attracted our attention. A German submarine had engaged her. While sending wireless calls for help, the gunner of the cargo ship was replying energetically. We crept up unobserved to 600-yd. range, and released the bow torpedo. This struck the German submarine amidships, and she sank. Wreckage was scattered over a large radius."

This laconic report was a summary of the first naval encounter between the Hun sea pirates and the United States submarine flotilla in foreign waters. In the six months following, at least 14 more of the enemy were accounted for; this is the conservative estimate, based on over 40 successful sea duels in which the enemy was known to have been damaged.

On paper, in the terse official language, this sort of success is robbed of its high dramatic quality. We can picture easily the slim, graceful destroyer, plowing through the rollers like the torpedo it fires—or dodges. We can see the chase. At 30 knots or better, the white foam curling over her bow like whiskers over the chin of a Mormon patriarch, the destroyer plunges at the spot where a U-boat was seen to submerge. As she passes, daring the torpedo certainly aimed to head her off, she drops depth charges from the stern. White geysers rise behind her. Perhaps she got her quarry; one rarely knows. The point is that we can visualize this engagement. The dangers are very real. On the other hand, we see one submarine rise suddenly from the depths, discharge a torpedo or two at another submarine, and then sink out of sight again. There is nothing spectacular —unless one of the torpedoes finds its mark.

The answer to this is simple. Up to the signing of the armistice all the young men to whom adventure in its most hazardous form appeals overwhelmingly, were applying for the submarine service. Until the government put a stop to it, applications for transfer from the destroyer to the submarine service flooded the navy department. After the pioneers had shown what could be accomplished, chasing Fritz around the North Sea became one of the most popular of the grim war sports.

For it is a sport; submarine versus submarine in the North Sea is a gambling game, with greater odds against the player than he faces in roulette, faro, or even fan-tan in a Chinese joint. Davy Jones is "house," and this cynical proprietor demands a percentage that would have made the crookedest booky of the old days blush for shame. For the crew of the submarine, victory means escape



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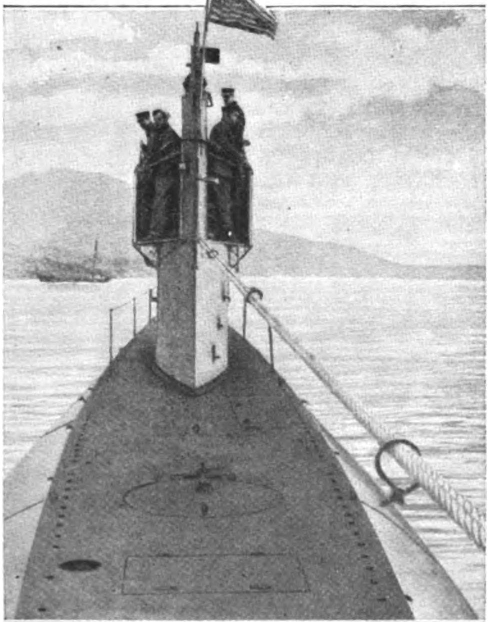
Player Than He Faces in Roulette. The Picture Above Gives a Glimpse of American Submarines in British Sought German U-Boats, and on Occasions Sank Them

with a whole skin, and perhaps a ribbon or medal to show for a hard-won success. The forfeit, in case of accident or defeat, is a watery grave and oblivion for all hands. "Cushy" wounds and Blighty are not for them; they either win, or lose all.

The reason for this lies in the fact that many dangers menace a submarine besides the craft it is seeking. New mine fields are planted daily by the Hun "egg layers" — submarines equipped to drop five huge mines through circular wells in the floor. Old and well-known mine fields are breaking up daily, scattering their diabolical, destructive machines throughout supposedly safe waters. In addition to these perils, there is the omnipresent German "dud" torpedo—the missile that has gone wide of its mark, and which floats, when its propelling force is expended, either on the surface or just below. Civilized countries manufacture their torpedoes so that they sink if they miss, and thus constitute no menace to innocent shipping. Not so with Fritz's "perfectos," however. With him every ship is an enemy ship, so he allows his torpedoes to stay where they will have the best chance of doing damage later. German U-boats released upward of 600 torpedoes a week in the North Sea and adjacent waters, and as less than one in ten finds a mark, it can be seen how real this menace was.



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Deck View of an American Submarine, Surface-Cruising on Patrol Duty in the North Sea: The Hazards Taken by These Craft for the Slim Chance of Bagging a U-Boat were Inspiring

Even this is not a full catalog of the perils faced by the intrepid undersea fighters. Nothing much is made of the incessant cold which pervades every submarine—the temperature of the ocean depths is rarely much over 40° F., and in winter even lower. Because there is no room in a submarine for men to exercise, the death rate from pneumonia and kindred troubles is high.

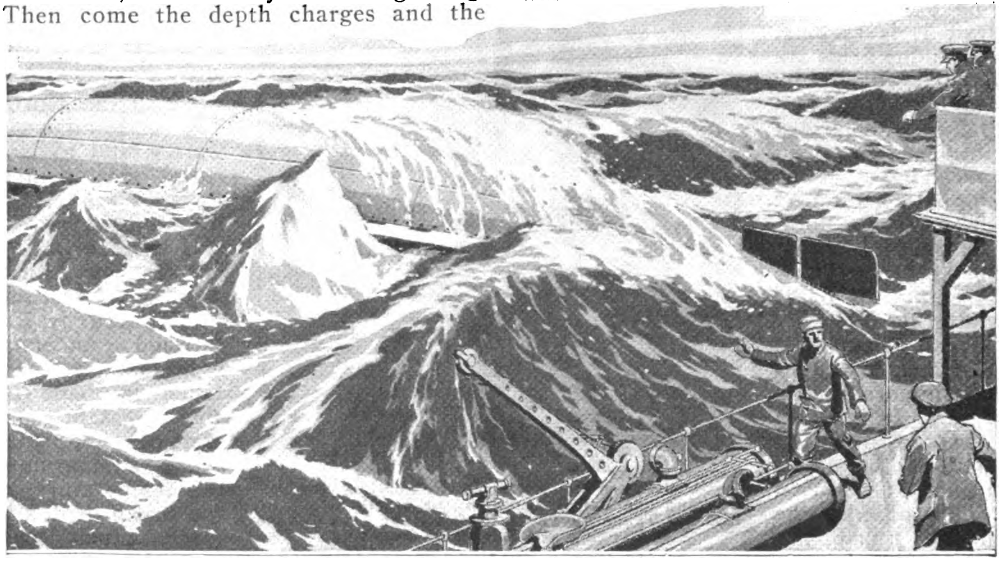
Last winter an odd accident accounted for the whole crew of one German submarine. The boat was found floating upside down! When towed in and righted it was found that the conning tower, hatch, and platform had become incased in a block of ice so thick that it evidently had overweighted the U-boat in a heavy sea. The crew, suddenly finding themselves upside down, had probably been unable to break through this ice in order to open the hatch, before they had been suffocated by chlorine. As the U-boat itself was unharmed, it was immediately put into service in the British navy.

Another risky part of the business is involved in the matter of identification. In the North Sea there were perhaps five German submarines for each one of the allied boats chasing them. Every allied destroyer operated under instructions to "shoot first and ask questions afterward." Because when attempting to stalk another submarine it is necessary to have as little showing above the surface of the water as possible, no allied undersea fighter carried an ensign on these occasions. As a result, it quite often happened that a British, French, or American destroyer made a swift attack on a friendly submarine.

All the latter can do is "duck and hope for the best," unless the attack has been perceived some time in advance. If 15-ft. depth is attained, the attempted ram is avoided, but this is just the beginning. Then come the depth charges and the wire drags. Because of serious accidents of this kind in the British navy, where boats were damaged or sunk by friendly destroyers before identity could be established, a new torpedo-buoy apparatus has been invented. The mechanism is simply a bobber buoy, shaped like an ordinary torpedo, and carrying an ensign that unfolds when the surface is reached. When a submarine is compelled to seek the depths to get out of the way of a friend, one or two of these buoys are immediately shot through the torpedo tubes. Because the crew of the destroyer is intently watching the surface of the water at this time, the boat below is given a chance to rise.

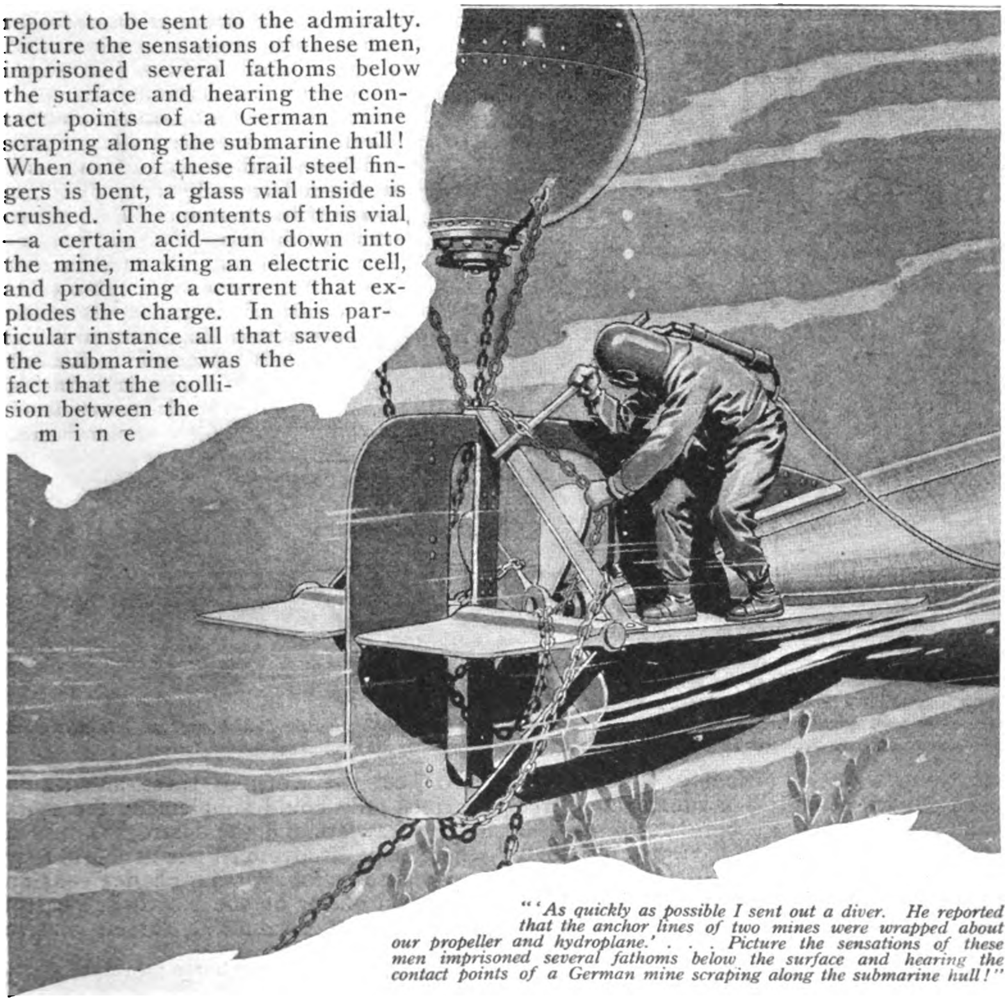
The sensations incident to running into an unexpected mine field while in pursuit of the enemy are told succinctly by the report of a British submarine commander. "While running submerged we felt a succession of light taps on the steel. Then our propeller tangled and the hydroplane could not be moved. I gave the signal to stop instantly, but in the next second I heard the scraping of some metallic object along the side. It could be only one thing, and while we sat waiting for that mine to explode all of us trembled. As quickly as possible I sent out a diver. He reported that the anchor lines of two mines were wrapped about our propeller and hydroplane. In 15 minutes we were free."

"All of us trembled!" It must be borne in mind that this was an official



"The boat was found floating upside down! When towed in and righted it was found that the conning tower, hatch, and platform had become incased in a block of ice so thick that it evidently had overweighted the U-boat in a heavy sea."

report to be sent to the admiralty. Picture the sensations of these men, imprisoned several fathoms below the surface and hearing the contact points of a German mine scraping along the submarine hull! When one of these frail steel fingers is bent, a glass vial inside is crushed. The contents of this vial, —a certain acid—run down into the mine, making an electric cell, and producing a current that explodes the charge. In this particular instance all that saved the submarine was the fact that the collision between the mine and the side of the ship had been so gentle that none of the contact fingers had been broken.

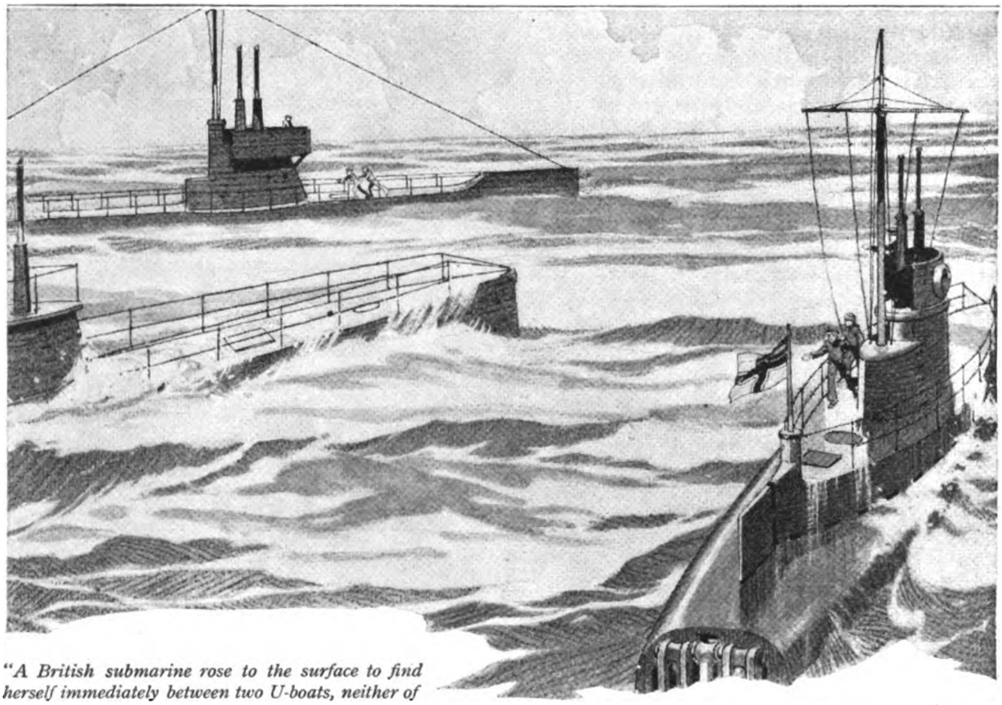


"'As quickly as possible I sent out a diver. He reported that the anchor lines of two mines were wrapped about our propeller and hydroplane.' . . . Picture the sensations of these men imprisoned several fathoms below the surface and hearing the contact points of a German mine scraping along the submarine hull!"

Actual combats between undersea foes are usually unexpected, sharp, and decisive. Of course, an incident like the first-mentioned in which a German submarine is surprised while actively engaged, happens occasionally, but the bulk of the conflicts occur at places and at moments hard to foresee. Dozens of spats have taken place at ranges so short that for a time neither combatant dared to use torpedoes, as an explosion so near at hand must certainly shatter both vessels.

On one occasion a British submarine rose to the surface to find herself immediately between two U-boats, neither of which was more than 40 yd. distant. The German craft were awash, and several of the crew of each were out, exchanging gossip and gulping in the fresh air, which to men who have been shut up for many hours while their craft threaded the perilous passage from the German base, is the greatest luxury in the world. It was a surprise to all parties, but the British craft got into action first. Wheeling in as sharp a circle as she could manage, she trained her guns on the farthest submarine. The Germans vanished below as if by magic, and both enemy craft started to submerge. Two shells were seen to make direct hits, however, on one of the U-boats.

No time for examination was given, though. While the second U-boat was going down it launched a pair of torpedoes from the bow. Both of these missed by a narrow margin, and it was doubtless lucky for all concerned that they did, else



"A British submarine rose to the surface to find herself immediately between two U-boats, neither of which was more than 40 yards distant. . . . It was a surprise to all parties, but the British craft got into action first. Wheeling in as sharp a circle as she could manage, she trained her guns on the farthest submarine."

all three fighters probably would have been sunk. The British submarine, after completing its circle, bore down on the spot where the second Hun craft had been just a few seconds previously. The intention was to ram—a desperate expedient that as often as not sends both attacker and attacked to the bottom, locked together in a death grip.

As luck would have it this time, however, the Hun attained sufficient depth to escape. Immediately, then, the British craft submerged also, seeking cover. Then ensued a game of hide and seek that lasted two full hours, and which exhausted the entire stock of torpedoes carried by the British craft. Most of these missiles were released "on suspicion"—directed at a mark thought to be seen, but which was not certain. All missed, but afterward, while cruising about, the sea contained great blobs of oil, presumably from the first U-boat that had been attacked by shell fire. Because German submarines in tight positions were in the habit of releasing great quantities of oil like this as protective camouflage—the idea being to convince the pursuer of his success, and thus win a chance to escape—the British craft let go her depth charges before departing for the home port.

At best the work of these allied submarines only could supplement the work of the trawlers and the destroyers. Even where they discovered Fritz at work, they had only a "slim sporting chance"—as an American officer on the North Sea patrol phrased it—of accounting for his elusive craft.

The important thing is, however, that some submarines have been sunk in this way, and at a time when every straw flung on the scales counted heavily. Next to this what mattered most was the fact that Fritz never had a moment on the surface of the sea in which he felt perfectly safe. The motor of a seaplane warns, a trawler or destroyer can be seen at a great distance, but the hostile periscope may steal up behind any wave. The effect of this strange warfare upon the morale of German submarine crews was bad in the extreme.

And the men who spend their hours down under the chilly sea, searching for the piratical foe? The navy scoffs no longer; this is a respected service, and one which demands the utmost in manhood and daring. Though he may not be a "civvy hero," the submarine fighter has won for himself a niche in our hall of fame.

NEW COAL DEPOSITS FOUND NEAR LYON, FRANCE

The fact that in normal times France consumes approximately one-third more coal than it produces—or a total consumption of 66,000,000 tons—has led various interests to make search for additional coal fields in the republic. Several surveys which gave promise of success were interrupted by the war. However, investigations in the Rhône basin, in the vicinity of Lyon, have been in progress for some time, and reports regarding the same have been recently made public. It has been found that there are three thin layers of coal about 1,000 ft. below the surface, each layer being less than 3 ft. thick, while at lower levels are veins 5 to 10 ft. thick. The extent of these deposits is not known, but it is thought that they will be of considerable local importance because of the large manufacturing interests at Lyon. The coal is particularly suited to gas production, it is said.

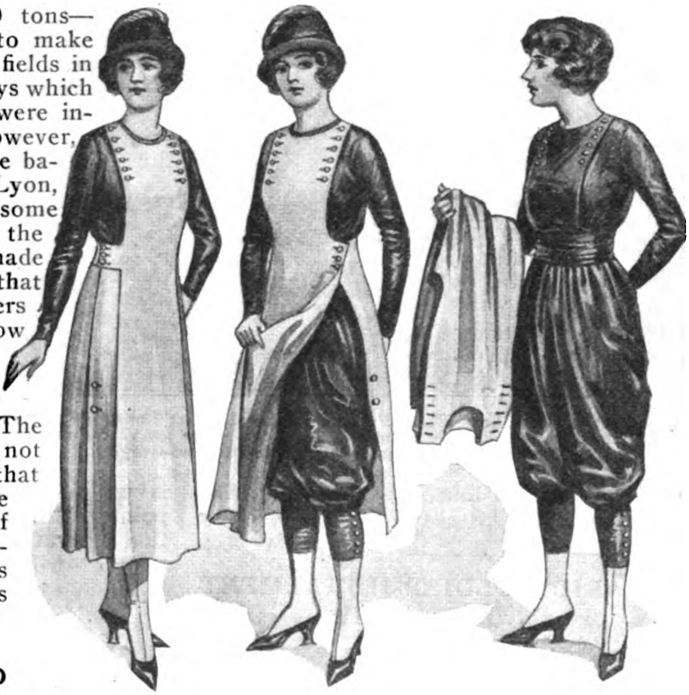
PROPOSE TO SPEND MILLIONS TO HOUSE DUBLIN WORKERS

Providing $43,000,000 worth of dwellings for Dublin workers is one of the big after-the-war projects recommended to the British government by an official ordered to investigate housing conditions in the Irish metropolis. The proposal draws attention to the fact that while the wealthy in this city have built themselves unusually fine homes, the working classes are badly off. The project includes the erecting of 16,500 houses at a cost of $2,000 each, and the purchase and reconstruction of 3,600 old dwellings capable of accommodating 13,000 persons. The cost of the latter phase of the work is estimated at $10,200,000. Many of these old houses were once the homes of the rich, but have long since been abandoned by them and divided up into tenements unsuited to large families and ill cared for by the absent landlords.

Large as the proposed expenditure seems, advocates of the improvement point out that it is small compared with many war items.

CLEVER CONVERTIBLE COSTUME FOR WOMEN

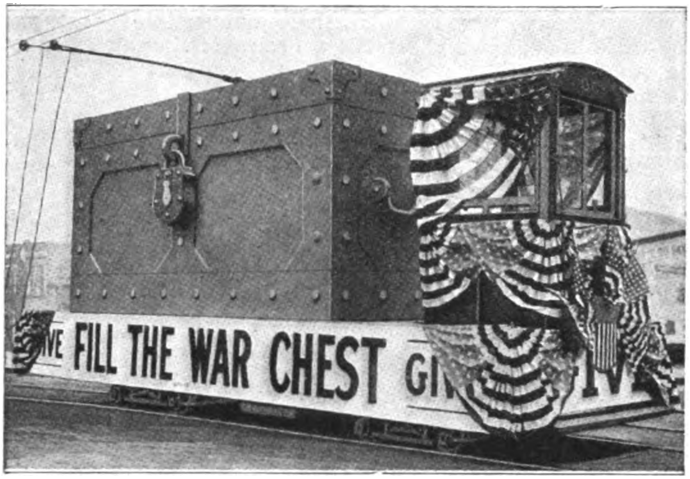
An attractive convertible costume, which marks a desirable simplification in woman's dress and doubtless is a result of the trend started by women war workers, consists of a jaunty bodice and bloomers of black satin and an apron of fine blue serge. For various indoor duties the bodice and bloomers meet all requirements, but when the occasion demands, the apron can be quickly slipped on, giving the whole outfit the appearance of an ordinary street dress. The apron buttons over one shoulder and part or all the way down one side, as the wearer prefers.



Three Views of a New Convertible Costume for Women: The Bodice and Bloomers Are of Black Satin and the Outer Garment, Which can be Quickly Put On or Off, Is of Blue Serge

BIG CHEST ON FLAT CAR ADVERTISES WAR FUND

A particularly effective advertisement for Cincinnati's general war fund appeared on that city's streets in the form of a huge war chest mounted on an electrically driven flat car. The "war chest" measured 8 ft. high, 15 ft. long, and 6 ft. wide, and had the appearance of being very strongly built, though it was made of thick pasteboard painted a steel gray. Hanging on the front was a huge lock made of tin, pasteboard, and wood, finished to look like heavy metal.



Cincinnati's War Chest, Eight Feet High and 15 Feet Long, Which was Carried through the Streets to Advertise the Drive for War Funds: It was Made of Pasteboard, Painted Steel-Gray

ONTARIO SOLDIER-SETTLEMENT PLAN IN OPERATION

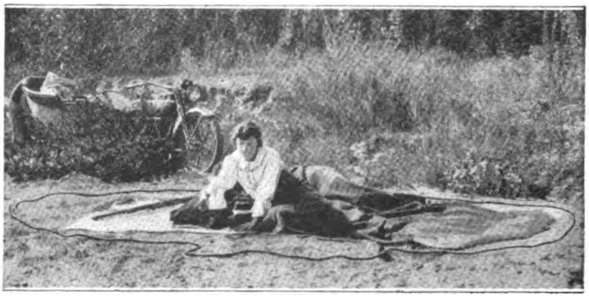
In a few months interesting results have been accomplished in furthering the interests of some of Canada's returned soldiers who have made application for 100-acre farms in northern Ontario. Two fertile townships on the Kapuskasing River, not far by rail from the town of Cochrane, have been set aside for soldier settlers. Allotments have already been made to 60 veterans. Forty-four of them are now residing with their families in their own homes, while houses for the 16 others are under construction. Much of their land has been cleared and some of it planted to winter wheat.

The Ontario government has established an experimental farm on the east bank of the river. This, in charge of agricultural experts, forms the community and coöperative center. Across the water, on the opposite bank of the broad stream, is the Dominion Experimental Farm, where 800 enemy aliens have been interned and kept at work clearing and planting about 1,000 acres of land.

Some 800 soldiers have applied for farms, and a most excellent scheme has been inaugurated for handling the men before actually turning farms over to them. They are paid $3 a day and given living accommodations and work at the government farm for a certain length of time. During this probation period they not only have the advantage of gaining practical experience in farming, but also have the opportunity of attending classes in agriculture and of testing their qualifications for pioneering. Later, the men's desire for a farm still obtaining, places are provided for them. The general working plan from then on, including the construction of houses and the extension of financial aid, has previously been outlined and is undoubtedly well known. The main point is that the plan has been put in actual operation and is working out advantageously for the soldiers, their families, and the Dominion government.

ROPE SERVES AS MAGIC GUARD AGAINST RATTLESNAKES

One unaccustomed to outdoor life in the West, on examining the accompanying photograph, would not believe that the two persons in the bed are protected absolutely against rattlesnakes. The secret of this seemingly magic security, as every plainsman knows, is the rope on the sand encircling the campers. It is made of horsehair and, for some reason or other, the snakes have an inconquerable aversion for crawling over it.



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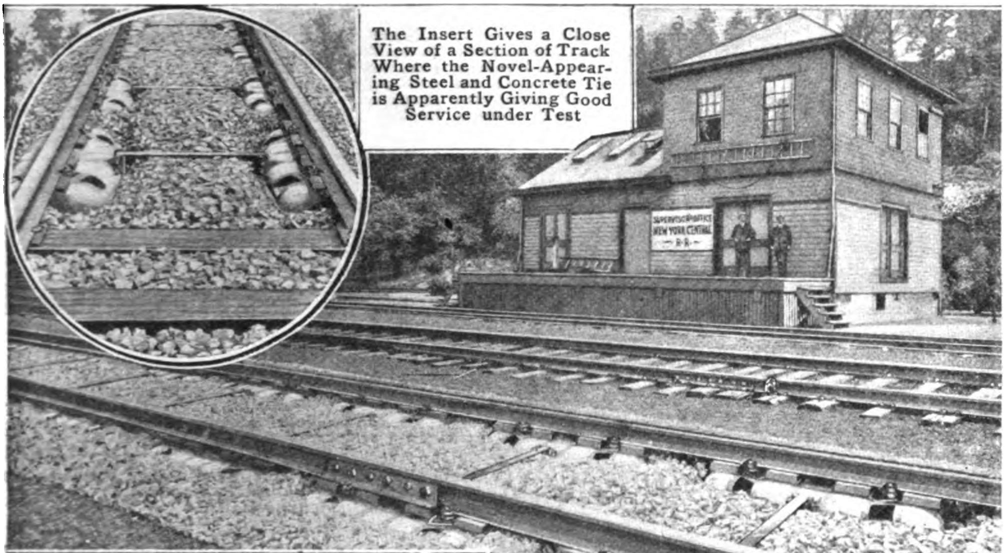
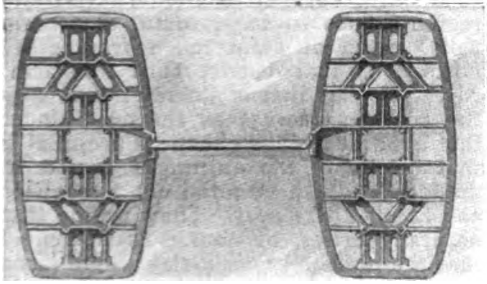
To the Tenderfoot It Is Almost Unbelievable That These Campers in Their Bed Made on the Sand Are Fully Protected from the Rattlesnakes Infesting the Region. The Secret Lies in the Rope Encircling Them

CONCRETE TIES SHOW TREND OF INVENTORS



The Insert Gives a Close View of a Section of Track Where the Novel-Appearing Steel and Concrete Tie is Apparently Giving Good Service under Test

A Section of Main-Line Track, Subject to Heavy Duty, Where Steel and Concrete Ties, Such as the One Represented at the Left, Are in Experimental Use: So Far as Known, They are Holding Their Own

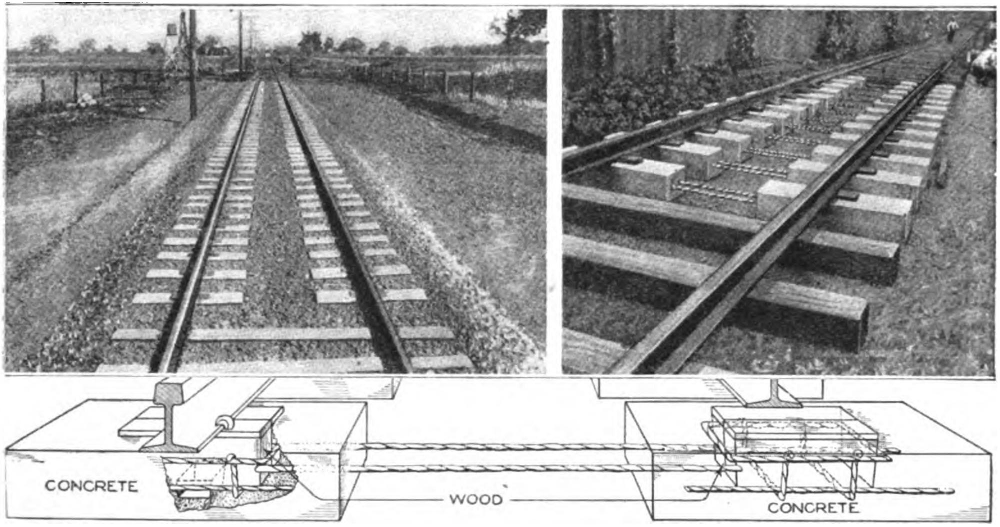


The Picture Above Gives a Clear Idea of the Tie's Steel Skeleton, Consisting of Two Connected Castings Ready to be Filled with Concrete and Used as Shown in the Other Photographs

For some time it has seemed almost patent to many persons that eventually a substitute, not to say improvement, must be found for the wooden railway tie. Many things contribute to this feeling, among them our diminishing timber resources, the increasing size and weight of rolling stock, and the advancing costs of material and labor. These elements and many others admittedly accentuate the desirability of a more or less permanent and easily available type of sleeper. Steel ties and concrete ones are neither new nor untried. Both have been advocated and tested for several years, but the fact remains that so far they have not been adopted. It is interesting, nevertheless, to observe two concrete and steel ties that represent the trend of inventors who are devoting their attention to this problem.

One of these consists of two inverted elliptical, cup-shaped steel bearings filled with reinforced concrete and connected by a T-bar. The bearings extend lengthwise with the rails, which are secured to them by bolts. The arrangement requires a considerably less number of ties per mile than the standard wood tie, yet, on account of the longer bearing surface of the new tie, a greater percentage of the rail is supported than when wooden ties are used. It is claimed that the new type of tie can be furnished at an initial cost per mile that is nearly as low as that of the wooden tie. The design purports to obviate the possibility of center binding, which is one of the difficulties which prevents steel and concrete ties of the conventional beam type from being successfully employed.

A second tie worthy of notice is similarly made of two rail bearings connected by a pair of crossbars, obviously so designed for the purpose of escaping center binding. The end pieces are reinforced concrete and shaped like an ordinary tie. Inserted in each is a wooden block on which the rail rests. This permits the use



The Drawing Shows the Structural Features of the Concrete Tie Which is Illustrated in the Photographs Reproduced Above. The One at the Left Shows a Section of Ballasted Track with the Ties in Place; the Other, a Similar Unballasted Section

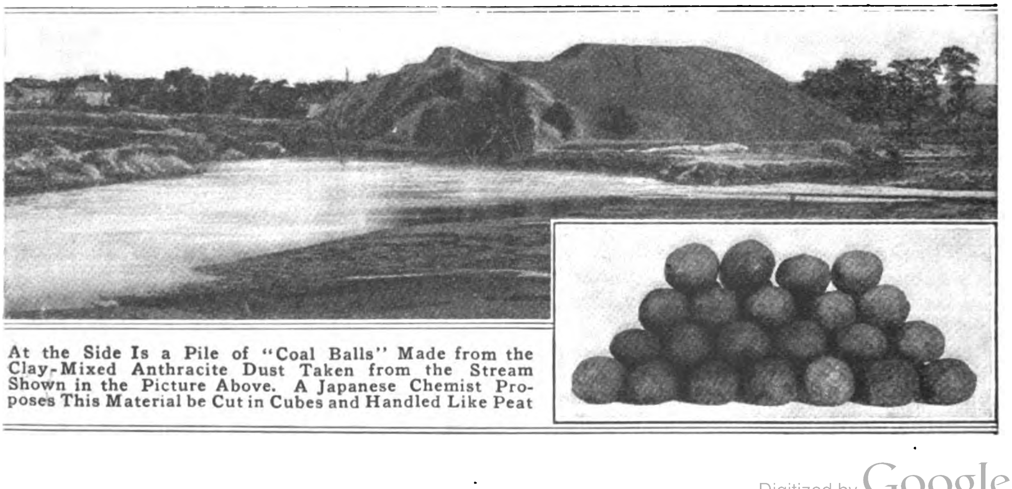
of spikes for fastening the rails, and provides a cushioning effect. The inlaid block may be renewed.

Each of these ties has been given tryouts on sections of different railways where the traffic is heavy.

CHEMIST URGES ANTHRACITE DUST BE USED LIKE PEAT

Methods are continually being formulated for enabling commercial utilization of the immense deposits of anthracite culm to be found at the coal fields of Pennsylvania. The potential fuel value of this coal dust is disputed, and according to some authorities all schemes for its salvage are worthless because the material itself is worthless. Be this as it may, a Japanese chemist in the Wilkes-Barre region claims to have found that "coal balls" made of culm taken from creek bottoms in that district burn satisfactorily. The clay that is already mixed with the coal dust serves as the only binder that is needed. The chemist's proposal is that creeks in the anthracite region be dredged and the material cut into cubes and handled like peat. The question that naturally arises, of course, is the effect that the noncombustible clay would have.

¶ Efficiency experts have been studying files and find that the life of one of these tools, on the average, is 25,000 strokes. To employ a file for more than its normal period of usefulness, it is claimed, more than doubles the cost of the work.



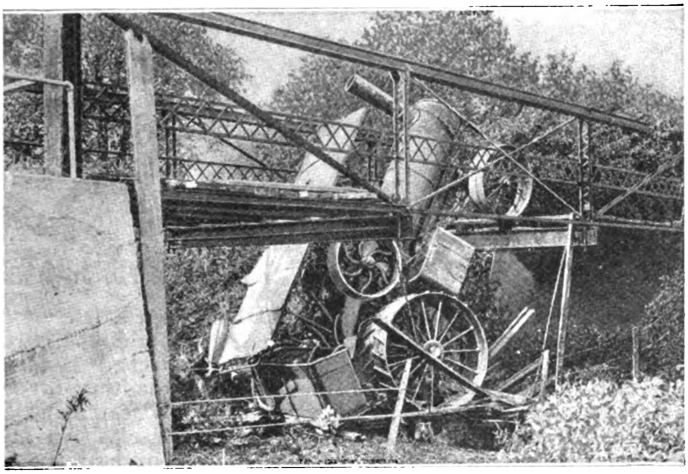
At the Side Is a Pile of "Coal Balls" Made from the Clay-Mixed Anthracite Dust Taken from the Stream Shown in the Picture Above. A Japanese Chemist Proposes This Material be Cut in Cubes and Handled Like Peat

CHAIN OF LANDING FIELDS FOR FLIERS IN AMERICA

Just as mariners need harbors, and motorists service stations, so airmen must be provided with landing fields if aviation is to be properly developed. To meet this need a chain of fields extending across the continent are being laid out and equipped. They will be made easily distinguishable and, like lighthouses, will help pilots to follow a definite course. On these fields, the sites for several of which have already been selected, will be supplies of fuel and oil, maps, charts, and barometer and thermometer ratings. It is proposed also to provide shops where a limited amount of repair work can be done. Many American communities have been quick to realize the future value of providing proper landing fields and there has been keen rivalry among neighboring cities to furnish facilities that will be apt to attract passing airmen.

FARM TRACTOR PLUNGES THROUGH BRIDGE

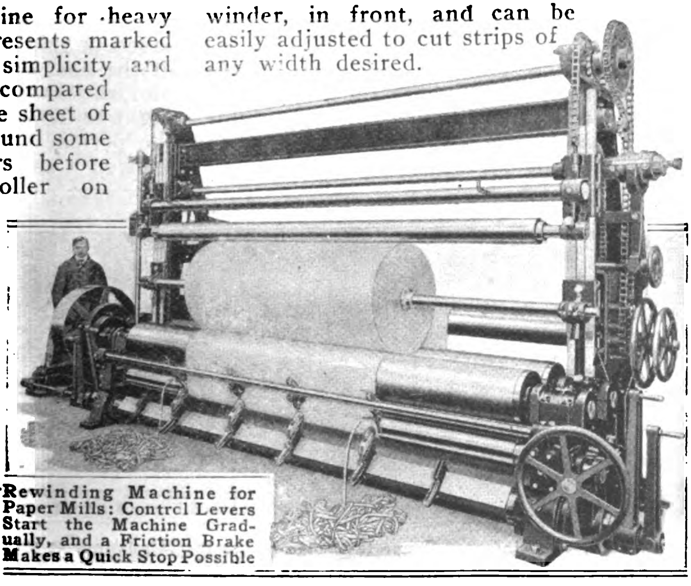
While a heavy farm tractor was crossing a highway bridge in central Illinois recently, the planking gave way and the big machine crashed through the structure to the earth beneath. Fortunately the engineer and fireman, who were operating the engine, were practically uninjured by the crash.



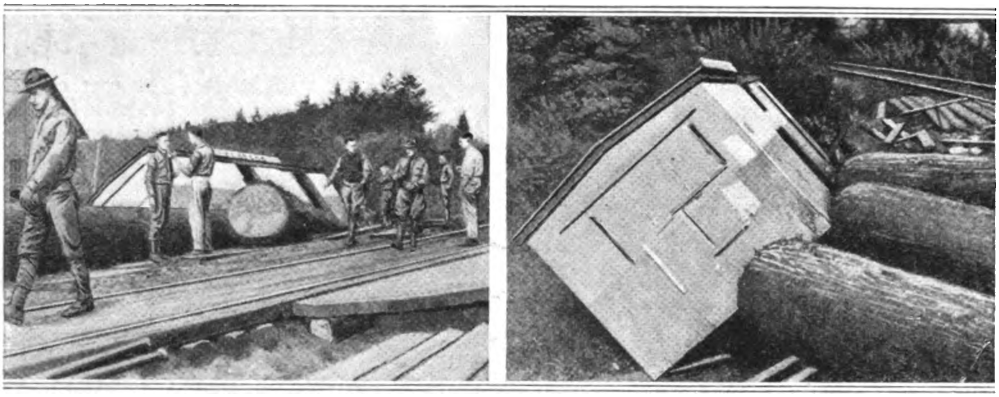
Farm Tractor Which Plunged, Rear End First, through a Highway Bridge in Central Illinois: The Engineer and Fireman Fell with the Engine but were Uninjured

NEW MODEL OF REWINDER FOR PAPER MILLS

A new rewinding machine for heavy work in paper mills represents marked progress toward greater simplicity and efficiency in operation as compared with other rewinders. The sheet of paper is drawn past or around some six idlers and spreaders before finally reaching the roller on which it is wound. To insure even travel, in case the sheet may be of irregular gauge, one of the shafts can be canted by means of a handwheel. At both ends of the machine are control levers which enable the operator to start it slowly and set it at a desired speed. A quick stop, which is a matter of prime importance with a machine of this sort, can be made by means of a friction brake. The circular cutters, of which there are six, are located on a shaft at the base of the rewinder, in front, and can be easily adjusted to cut strips of any width desired.



Rewinding Machine for Paper Mills: Control Levers Start the Machine Gradually, and a Friction Brake Makes a Quick Stop Possible



Heavy Spruce Logs Rolled from a Passing Train and Rammed the Box-Car Depot at Clatsop, Oregon, Knocking It into a Ditch, as the Two Views Above Show

CLATSOP DEPOT IS BOMBARDED BY LOGS ON WAY TO BERLIN

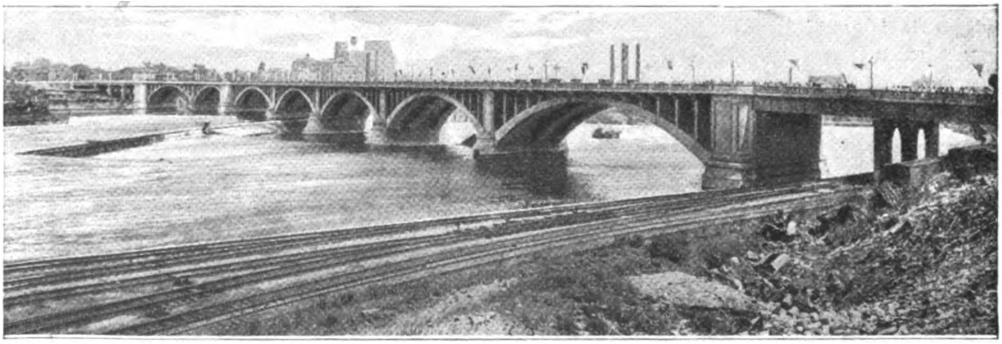
When one considers the importance with which railway stations were rated by airmen on bombing expeditions during the war, it seems fair to assume that Berlin would have rejoiced some weeks ago before hostilities ceased, had it heard of the damage suffered by the depot at Clatsop, Ore. Three spruce logs rolled off a flat car passing the station. They struck the converted box car and knocked it into a ditch. They were later recovered, however, and delivered at a mill, there to be cut into aeroplane material, while the station was soon righted and repaired.

NEW SPAN OVER MISSISSIPPI AT MINNEAPOLIS

After some years of delay the ninth and largest bridge across the Mississippi River, at Minneapolis, open to general traffic, has been completed, at a cost of $850,000. The structure is a magnificent specimen of reinforced-concrete bridge building. It is 2,162 ft. long and has seven arched spans. In addition to a broad roadway for vehicle traffic there are two 12-ft. sidewalks and a double street-car track. An unusual feature is the slight curve at the eastern end which was provided so that water-power rights of certain flour mills might not be interfered with. At one time, when the project was in its preliminary stages, the plans were changed by the Federal authorities on account of certain geological formations in the river bed.

OVER MILLION TONS OF COAL SAVED BY "EXTRA" DAYLIGHT

Careful investigation shows that in the seven months of "daylight saving" approximately 1,250,000 tons of coal was saved in this country. Calculations made of the coal consumption in a community of 1,000,000 people indicated that the saving was 17½ tons per 1,000 persons for the period. Figures from other districts showed a similar saving.



New $850,000 Reinforced-Concrete Bridge across the Mississippi at Minneapolis: The Structure is 2,162 Feet Long and the Eastern End is Slightly Curved to Avoid Interference with the Water Rights of Certain Flour Mills

COMMENT AND REVIEW

Great Britain's War Record

OF all people the English are least concerned with praise for having done what the conscience of the nation understood to be the right thing to do. They never seek applause, nor are they swerved from a course deemed right, for lack of it. It is a sterling quality, which has often been mistaken for mere stubbornness. Among some other things we have discovered during the war, one is that the Huns have insidiously and persistently, for years, sowed seeds of suspicion and hate of the English throughout the world. Because Germany was jealous of England she hated her; and hating her wanted all other countries to hate England also. And so around the world went an army of German spies whose mission was to spread a propaganda of hatred. Germany, ungrateful, had no cause for this. English ports the world over were open freely to German ships to come and go and trade at will. England herself bought from Germany annually millions of dollars' worth of German-made goods in excess of what Germany bought from England. Germans in England were as free to work, travel, sell goods as any Englishman, while the Englishman in Germany was subject to constant surveillance and in arriving at a German city must first of all file a lengthy report containing a personal history, the nature of his errand there, and how many days he intended to remain in that place.

As we all know, it was a question of honor and not necessity which brought England into the war immediately. She, too, with the exception of a strong navy was entirely unprepared, and the world will never cease to owe a debt of gratitude to those brave men, who with only scanty supplies and scantier ammunition, held, actually by a thread, and at awful cost of life, the Hun line, while an army was gathered and munition works were being built. But for the English navy, the war would have ended very differently. But for English ships, also, only 30 per cent of our troops could have reached France.

Of all the great things of the war, none is greater than the magnificent loyalty of the English colonies to the mother country. While they might have remained aloof, without a moment's hesitation they unitedly and heartily rallied to her aid. Of their best of life and treasure they sent from far-distant lands and climes, freely, voluntarily, uncomplainingly. It was a grand spectacle; a mighty tribute.

Because no press bureau was maintained to keep us constantly reminded, there are few of us who as yet begin to realize our debt to Great Britain in this war; but time, which adjusts all these things, will write the story of our debt, and with that understanding will come a truer sense of our obligation.

◆

The War Ends

WITH a silence like that which follows the mighty crash of a great organ, the Great War came suddenly to an end. No longer do the weary soldiers at listening posts strain their ears through long night watches; star shells have ceased to burst and flame over No Man's Land; cannons have cooled; machine guns utter no sound; the exchange of all manner of deadly missiles has stopped. At last Peace, which for four slow, dreadful years has seemed afar off like a mirage, has come. The thousand and one activities of battle, intense to the last ounce of possible human effort, are relaxed. Ships now cross the ocean in safety; smoke from thousands of ammunition plants no longer darkens the sky; tired workers return once more to their homes; armies are demobilizing; reconstruction of devastated homes and farms and factories is contemplated; the dreadful military debauch has consumed itself; the world draws a great sigh of exhaustion and relief; the conflict is ended.

In all history no message ever sped so gladly nor so fast, as the few words flashed through the air, and under oceans, and over land wires, until around the whole world and to its uttermost accessible parts the news was carried. What wonder that all civilization gave vent to a frenzy of joy almost barbaric; that men shouted and women wept; and little children witnessed an event which threescore years and ten hence, they will relate to other wide-eyed children. In our joy let us not forget those millions of fathers whose voices refused to cheer, and those mothers and wives and sweethearts whose eyes were dry, because their hearts were bowed down with a sorrow no victory can ever compensate.

The Huns ceased only when physically exhausted; when their ammunition was spent; when the war had reached their own borders; when they no longer possessed the ability to murder the defenseless; to gas the brave. Their regret is that they failed, but not one single word of penitence for the harm they have done, the sorrow they have caused. Instead they think only of their bellies, and demand, not supplicate, the food they have so wantonly destroyed for years; they whine lest the very cars they stole from France and Belgium be returned to their rightful owners. They have been beaten in what was for nearly four years an unequal struggle, but for any word which has yet come out of Germany they are the same unregenerate Huns who, casting aside all the obligations of a civilized nation, marched into Belgium in August, 1914.

And what of that archconspirator and his associates in power, who with bags of gold have sought hiding in near-by, and so-called neutral countries? Is there no justice in the world? Are these who through long years planned, and spied, and gathered war supplies, and made munitions and trained millions of fighting men; are these—after all their deliberations and crimes against the world—are these to live? Is there any crime in all the annals of evil of which these men are not guilty? Is there anywhere in all the dark, bloody chapter, one single redeeming act, which they can plead for mercy? Were there the slightest spark of remorse, did they possess one element of true manhood, they would long ago have taken their own lives, and cheated justice of her dues. But no; even at this writing there lacks any reliable evidence that the kaiser is not even now still the kaiser of the Huns, waiting only a turn of the wheel of fortune to return to his throne and insult the nations of the world by demanding recognition as one of its rulers.

As merely so many pounds of living, breathing tissue, the life or death of these beings means little; in a few years at most nature will demand her due; but as a principle of right, as an act due those loyal millions who have suffered and died to perpetuate freedom for the world, the allies cannot, must not, hesitate to try, convict, and execute the kaiser and his guilty associates.

* * *

What of Future Wars?

AND what of future wars? Will nation war against nation in the days to come, and will the refinement of cruelty in killing be still further developed from its present advanced stage? Just now, with the smoke and smell of battle still hovering in the air; with all its dead and injured and sick fresh in mind, we find it hard to imagine that another war could be.

It is difficult to believe that any nation is likely to deliberately make war upon another nation so strong and powerful as to almost insure the defeat of the aggressor. Germany was positive in her belief of her superstrength to win, otherwise she would have postponed the day until she was sure.

We preserve order in our cities largely by prevention; there are people aplenty who dislike other people to the extent of wishing to assault or even kill them, who nevertheless refrain from doing so because of the presence of police and the fear of punishment. Except for those temporarily unbalanced, the great majority are peaceably inclined. Even were the police inadequate, there is the State Militia, and even the National Army.

Theoretically, a system which suffices to maintain order, and administer justice and punishment, between the citizens of any one country ought to be capable of expansion to maintain order between countries. Probably the one thing which most stands in the way is their lack of acquaintance, one country with another. It is much less easy to understand what a man whom you have never met says and does, than after you come to know him. A remark which sounds offensive may prove on acquaintance to be intended as a compliment. In other words if an international board to maintain order and administer justice between nations is to succeed, its member nations will have to know one another better, and practice the golden rule. A good start has been made; the English, French, Belgians, Italians, Portuguese, and Americans, with representatives of all their several dependencies, have been thrown together as never before.

American tourists bent on a holiday formerly returned to talk chiefly about the gayety of Paris until we thought all France frivolous; the English were considered a bit distant and haughty, and so on. In the great melting pot of the fighting trenches, the furbelows were all cast aside and the splendid manhood and ideal spirit in each has stood revealed. Preconceived ideas each of the other have been reversed. Even the Hun has little to say about the American being a dollar chaser since the marines chased him out of Château Thierry.

It is well that our President should disregard precedents and attend the Peace Conference. In days to come the heads of our allied countries, and other countries, may likewise well forget precedent and visit us. We might with advantage revise the histories and teach our children the best and grand things in the life of other nations rather than so much of the worst.

People are apt to base judgment on their personal experiences. One unscrupulous exporter can poison a well of foreign sentiment from which hundreds will drink. Never was a time when high moral standards of business meant so much for the future as now. The man who for selfish ends abuses the confidence of a buyer in another country, thereby betrays his own country and is a traitor.

Such an opportunity for mutual understanding and universal good will has never occurred. The time calls for the exercise of the highest impulses and sound judgment, and that same generous, farsighted vision through coming years which the framers of our own Declaration of Independence displayed. A spirit almost of inspiration is needed if the union of nations shall be so framed as to provide a bulwark which the avarice and cupidity of any and all nations shall be powerless to destroy.

Revival of Learning

AS flowers spring up from unpromising battle-scarred lands; as storms clear the air; and the conflagration which seemed only a great calamity is found to provide the long-dreamed-of opportunity for a city beautiful, so too, war with all its awful penalties is not without some compensations. One of these will be a literal "revival of learning" when our boys reach home from camps here and across the ocean.

In the period immediately following the Civil War, there was a great demand for books; following this war there will be a great demand for both books and teachers. With characteristic impatience the average American boy has looked on his school work as almost wasted years, and longs to enter some occupation which at the time seems more constructive, and nearer a man's work. Many are obliged to leave school and go to work for economic reasons; others do so who might have continued their studies.

The organization of our Army and Navy has been a great object lesson to the enlisted men. Not that the one with the educated, trained mind was a whit braver or had better courage than the other, but the essentials to become an officer required a mind trained to think clearly and accurately, and this condition depended on previous study. The ability to accomplish the unusually severe mental task of mastering the course of intensive training in the limited time allowed in the officers' training camps depended very largely on the kind and amount of study which the young man had behind him. Obviously, the man who is thoroughly experienced in the operation of a certain intricate machine could more easily and quickly master some other intricate machine than he whose training and experience had been confined to the operation of the wheelbarrow in which the raw material was brought and the finished parts were removed. The demonstration was unavoidable; the object lesson was plain to all.

Hundreds of thousands who formerly regarded technical training with indifference realized what a distinct advantage it provided, and the desire and ambition to study and master at least some one branch became a fixed purpose. This was evidenced in the call for technical instruction books which by tens of thousands were sent to camp reading rooms. And one of the best things which our boys will bring back with them to civilian life will be this determination to study and learn. A small percentage will return to colleges and technical schools, where there is likely to be a wholesome revision of the various courses which have long been cumbersome. There will be a discarding of many nonessentials, and a greater specialization in the thing desired. There will be less chemistry in an electrical course, and less electricity in the chemical course; Latin and Greek will continue the entrance to a classical course, but should be eliminated as essential to a course in cement engineering or irrigation.

For that great army of boys who cannot return to colleges and schools, but who are determined to learn, there are fortunately the correspondence schools with a choice of studies covering a wide range of practical subjects. There is a certain stimulus to study which comes from the team work of classes, which the solitary student, working alone, lacks; on the other hand, this can be largely compensated in the determination of the individual whose study is purely voluntary. As between the final results of the boy in a class of 100 who does not care to learn, and the one who, working by himself, is bound to master his chosen subject, the latter will be the winner. In no country in the world are the opportunities for study so generous as here; in no other country are the rewards so sure and splendid. In this revival of learning the correspondence schools are destined to come into their own, and render an individual and national service of untold value.

* * *

Fires on Farms

WHEN a fire occurs in a farm house, or barn, about all the owners and near neighbors can do is to save as much of the furniture or live stock as possible. and try to prevent its spread to other buildings on the place. One of these days, when good roads are universal, there will be one or more motor fire engines in each township which can be summoned by telephone. This will result in a considerable reduction of the present annual loss from fires on farms, which amounts to millions of dollars. The better plan of course would be for each farmer to have his own fire protection, and this is much less expensive or difficult than many might suppose.

It is not so long ago when a farmer would doubt your sanity if you suggested his having an electric-light plant of his own on the place. Today there are thousands of such plants, and increasing in number rapidly. A fire-protection system is just as practical, and before long will be as numerous. The details are simple.

In occasional instances a reservoir on a hill near by, with underground pipe and a few lengths of hose, solve the problem. In most cases it means a large underground cistern whose contents should be sacred and never drawn upon except for fire purposes. A force pump is not expensive and lasts for years. These are already on the market, with gas engine either attached or without, as desired. Practically every farmer now has his gas engine which could be instantly connected to the pump. In a pinch he could make his automobile furnish the power. In peace times the expenditure for cistern, pump, pipe, power, and hose would be easily within the reach of every well-established farmer, and the first fire checked at the start would pay for the entire outfit several times over. Eventually fire-insurance companies would reduce their rates on buildings so protected. With so many power implements already in use on a farm, the starting of the fire pump involves nothing which could not be done by a farmer's wife, boy or girl, and anybody with one arm can hold a hose. Taken in time probably three-fourths of all fires on farms could be extinguished with a few barrels of water if poured continuously. The trouble with the pail-and-carry system is, the supply is too slow, where a steady stream, even if not very large, gains on a fire.

* * *

Throttling the Cables

IT cannot be denied that the action of the President in taking over the ocean cables five days after the war had ceased is received with great uncertainty regardless of political party. Through the entire period of the war the cables were open to business and the news agencies, subject, of course, to censorship. Now, after the war is ended, and the most important work of statecraft ever attempted is about to be undertaken, does the administration reach out to grasp the ocean lines of communication. The performance and history of the Creel Bureau of Information does not inspire the utmost confidence in the coming reports of the Peace Conference, which apparently are to reach us exclusively through that agency. To all appearances the very first of the 14 principles of international agreement proposed by the President, viz., "No secret diplomacy," is about to be disregarded by its own author.

It is an undertaking of the most vital consequences, when any one man, or set of men, undertakes to decide on the binding conditions by which this nation shall be held in its future relations with other nations. The Peace Conference discussions and proceedings, of all congresses ever held, should be the most open and above board, and for this country, of all countries, to start out with all cables and wireless under the absolute command of one person, cannot fail to arouse a question as to why the American people should not be allowed not only full and free reports of acts of the congress, but also of expressions of opinion of our allies and others. The step is an exercise of an autocratic power conferred to be used as an emergency of war, and was never intended to be carried over beyond the moment of the cessation of hostilities. The country would never have given its approval of such an action in peace times, and resents it now.

"Lay all the cards on the table" is a somewhat common, but very expressive phrase, which represents the feeling of the American people at this time.

* * *

Feeding the Huns

ALMOST the first utterance from surrendered Germany was a demand on the allies for food, and as this demand was flashing across the ocean, Hun armies, in anything but a famished condition, were marching home. At the same time reluctant prison doors in Germany opened, and through these doors came, by thousands, such wrecks of manhood as the world has seldom seen—walking skeletons who could barely walk, thrust out in rags and shoeless, to make their way, as best they could and if they could, to the allied line. Many never reached that long prayed-for haven, but exhausted with cold and hunger died by the wayside. And it is the people responsible for such fiendish wickedness that reach out their hands and demand the allies feed them!

It would be unchristian, though a just retribution, if the allies could be given the feeding of the Huns for a time, with food of the same nourishing value, and served in the same way as the Huns fed the prisoners of the allies. These same prisoners would know how to serve—those who were tied to stakes without food or water for two or three days at a time, with food in plain sight but just beyond reach. There are many yet alive who have witnessed this refined cruelty of the middle ages, and some who even survived the torture. These would know how Huns should be fed.

And those others who had choice of putrid fish or nothing; and those in whose bowl of thin soup the Hun women spat as they handed it over to French and Belgian and English "dogs." These victims, too, know how Huns fed others.

The starved millions in Belgium, and Poland, and Armenia, whose Red Cross supplies were intercepted and used by Huns; these skeletons would gladly rise from their unmarked graves and help feed the Huns. And innocent children who trustingly smiled as they ate the poisoned sweets, they could tell in lisping words what should flavor the food for Huns. And those who died in torture from drinking at poisoned wells, these also would serve as cup bearers while Huns are fed.

The wicked prosper—for a time. With our narrow span of life we grow impatient because justice delayed seems to us as justice forgotten; but in days to come, retribution is inevitable, and children's children will pay the penalty for the sins of the fathers.

The Huns will be fed; and they will eat the husks of bitter punishment; as they have sowed so shall they reap, and the harvest will be one of sorrow, all in due time.

H. H. WINDSOR

November 26th

CINCINNATI GETS HUGE FLAG ON VICTORY DAY

A notable Victory Day gift, designed as an expression of patriotism and thankfulness on the part of the donor, was an immense American flag presented to the city of Cincinnati by one of its citizens. The emblem measures 101 by 52 ft. and, when unfurled in the midst of rejoicing on November 11, completely covered the main façade of the city hall.

Immense Flag Hanging in Front of the Cincinnati City Hall on Victory Day: The Emblem Was a Gift to the City in Commemoration of the Dawn of Peace

LUNGS REPAIRED AND CLEANED BY DELICATE OPERATION

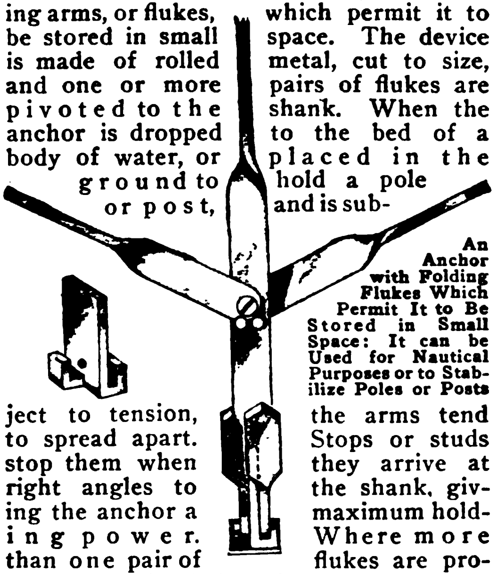
International attention is being directed to remarkable lung operations that have been successfully performed by Col. Pierre Duval of the French Reserve Medical Corps. In describing some of his work to American army medical officers at one of the southern camps a short time ago, he explained that he enters the chest cavity by making a six-inch opening through the ribs. With the aid of forceps he then lifts the lung through the aperture and lays it on the chest wall. The bleeding blood vessels are tied, the outer surface of the organ cleaned, and the tracts swabbed out with gauze. During this procedure the member is manipulated, like a sponge, with one hand. Continuing the work, the colonel has felt his way along the walls of the lung and removed shell fragments and bullets. Torn pieces of the organ have been excised and the wound sutured. After this the lung has been replaced in its normal position and the aperture closed. Two-thirds of the patients who have been subjected to operations of this kind have fully recovered. It should be understood, however, that the lung is not separated from the body, but that part of it is lifted from the chest cavity.

NEED FOR TOOLS AT TUSKEGEE ON ACCOUNT OF FIRE

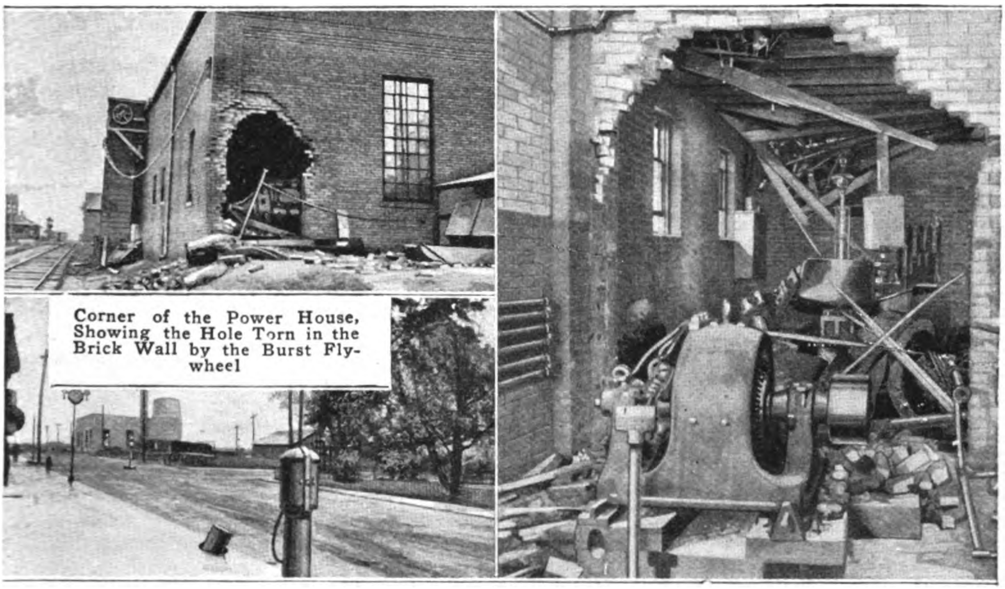
A fire which recently destroyed the Trades Building at Tuskegee Institute in Alabama has so seriously handicapped that school that the management is making an urgent appeal for donations of tools and machinery. Among the trades for which equipment is especially needed are tin smithing, carpentry, wood turning, printing, tailoring, harness making, plumbing, electric lighting, and painting.

ANCHOR WITH FOLDING ARMS STOWS INTO SMALL SPACE

A feature of a recently patented anchor, for use on land or in the water, is its folding arms, or flukes, which permit it to be stored in small space. The device is made of rolled metal, cut to size, and one or more pairs of flukes are pivoted to the shank. When the anchor is dropped to the bed of a body of water, or placed in the ground to hold a pole or post, and is subject to tension, the arms tend to spread apart. Stops or studs stop them when they arrive at right angles to the shank, giving the anchor a maximum holding power. Where more than one pair of flukes are provided, the shank is twisted so that they point in various directions when extended.



An Anchor with Folding Flukes Which Permit It to Be Stored in Small Space: It can be Used for Nautical Purposes or to Stabilize Poles or Posts



Corner of the Power House, Showing the Hole Torn in the Brick Wall by the Burst Flywheel

In the Lower View, at the Left, a Fragment of the Wheel is Imbedded in the Cement Walk, 500 Feet from the Power House Shown in the Background. The Wreckage in the Engine Room is Shown at the Right

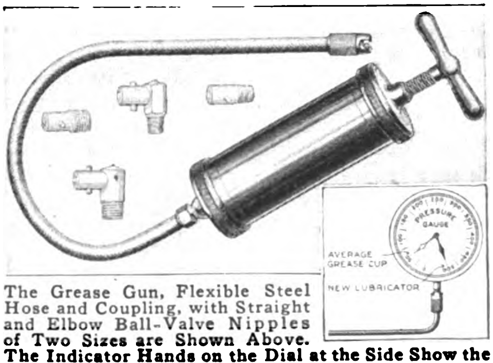
RACING FLYWHEEL BURSTS AND WRECKS PLANT

The destruction wrought by the bursting of a flywheel in an electric-light plant in New Rockford, N. D., recently, indicates vividly the disastrous results which may follow failure to control the speed of an engine. The engine in question was of the Corliss type, and for some undiscovered reason the governor failed to work. The speed of the flywheel, which normally was 100 revolutions per minute, was increased to many times that number. Eventually the big casting burst, and fragments were hurled many hundred feet in all directions. The engine room and the machinery it contained were completely wrecked, except a small generator which, almost miraculously, was unharmed. A great hole was torn in one of the brick walls, and a piece of the wheel, weighing about 450 pounds, was thrown high in the air. It landed in front of a furniture store 500 ft. from the power plant, burying itself deep in the concrete sidewalk. The enterprising furniture merchant hastened to paint an advertisement on the side of the fragment.

¶It is stated that during one of the last great offensives of the allied forces the consumption of gasoline by the army and the air forces amounted to about 500,000 gallons per day.

NOVEL LUBRICATING SYSTEM ELIMINATES GREASE CUPS

Of possible interest to motorists is a lubricating system of late development that provides for the elimination of grease cups from a car. Their place is taken by ball-valve nipples, and periodical lubrication is accomplished with the aid of a cylindrical compressor supplied with a flexible-steel hose and bayonet coupling. The latter enables connection to be made with one of the nipples without prolonged screwing. Grease is forced into the bearings under high pressure so that the used lubricant is discharged simultaneously.

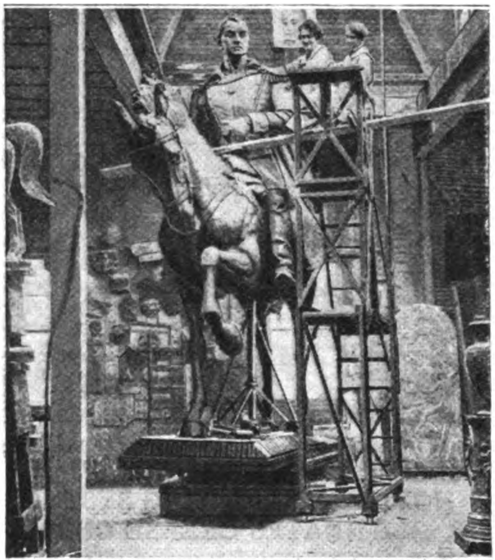


The Grease Gun, Flexible Steel Hose and Coupling, with Straight and Elbow Ball-Valve Nipples of Two Sizes are Shown Above. The Indicator Hands on the Dial at the Side Show the Difference in the Pressure Exerted by the Average Grease Cup and the New Lubricator

When grease cups on a car are integral with shackle bolts, a special cap with a ball-valve nipple attached, is used.

THIRD MEMORIAL TO BOLIVAR ACCEPTABLE TO NEW YORK

After two previous unsuccessful attempts on the part of the Venezuelan government to present the city of New York with a permanent memorial of Simon Bolivar, a satisfactory equestrian statue of the famous South American general and statesman has been executed and will be erected in Central Park. The monument is the work of a New York sculptress and has won the praise alike of the Venezuelans and of American art societies. It is of bronze and represents the popular hero mounted on a spirited horse. In 1883, a statue of Bolivar was erected in New York, but was so severely criticised by artists that the Venezuelan authorities finally ordered its removal. In 1897, another sculptor was commissioned to make a statue of the same subject for New York, but his work was rejected and so was never erected.



Statue of Bolivar, the Venezuelan Hero, a Gift from Venezuela to New York City: Two Previous Statues of the General, Intended for New York, Proved Unsatisfactory

GERMANS RESORT TO BELTS OF WOVEN PAPER

An indication of the straits to which the war brought the Germans with respect to certain materials is found in the fact that they resorted to making machinery belts of woven and braided paper. The paper fabric was cut into lengths of perhaps 100 feet and was subsequently used in making belts of the desired width and thickness. A core of cotton, sheet metal, or of interwoven thread and wires, was surrounded with paper strips and the whole was sewn with strong thread, making a belt both strong and flexible, it is said.

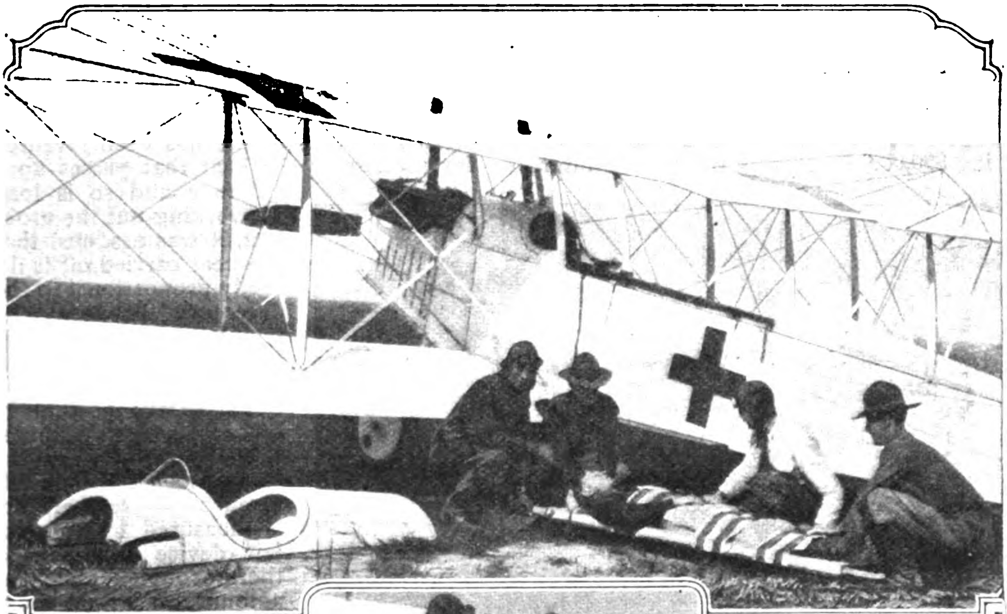
¶Much excitement has been created in Dutch East India by the discovery of rich iron-ore fields on the Island of Celebes. It is estimated that there are 1,000,000,000 tons of ore in the district in question.

FLYING HOSPITAL WAS LAST GREAT WAR INNOVATION

One of the most interesting of the innovations in military aeronautics introduced before the war's collapse, was the flying hospital. The marked success that attended the development and use of aerial ambulances, employed for quickly conveying seriously wounded soldiers to surgical stations, suggested the feasibility of reversing the scheme by conveying surgeons to patients in the field.

Like the first aerial ambulance, the flying hospital was a French invention. It is not known whether or not a complete squadron of machines, as planned, had actually been commissioned before the truce was signed. One of the specially outfitted units, however, is described as carrying, in addition to the pilot, a surgeon and an X-ray operator. Its equipment consisted in part of a folding X-ray table, supplied with the Mondain cap for daylight work and the Nemirovsky compass for locating shell fragments and bullets; a folding combination lavatory and instrument stand, and an electric sterilizer.

When the plan was first broached, it was thought that one or possibly two of the flying hospitals could serve a front of approximately 125 miles. It was reasoned that at periods of emergency, when advance posts without X-ray and operating equipment were overwhelmed, a flying hospital could be dispatched in response to a telephone call for assistance. If need be, its equipment and staff could be delivered at the post and the machine returned to headquarters to pick up another outfit and its operators. How the scheme actually worked out in practice yet remains to be told.



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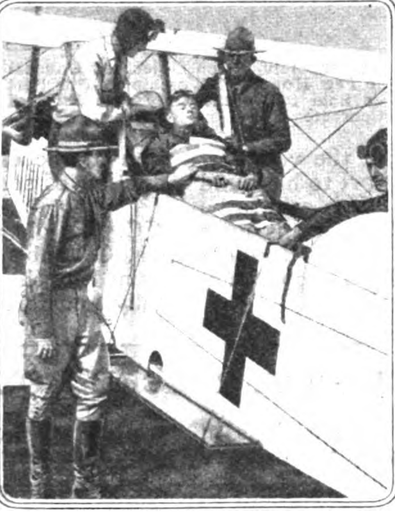
The Picture Above and Those Accompanying It Show the First American Aerial Ambulance in Use. The Machine, Painted White and Bearing the Emblem of the Red Cross, was Designed for Carrying Dangerously Wounded Soldiers Quickly to Field Hospitals or Surgical Stations



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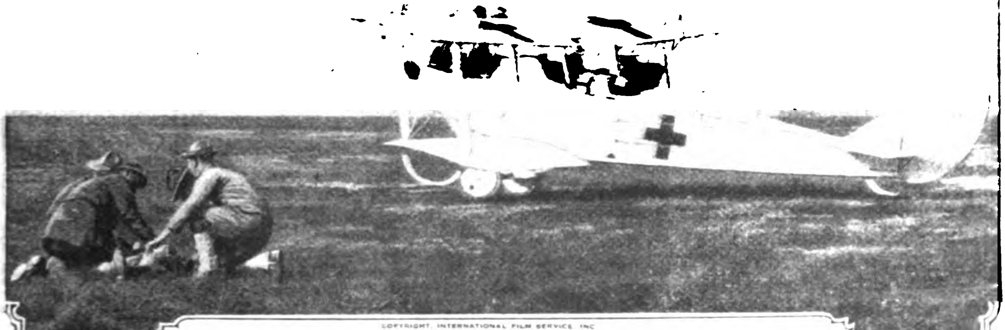
While the Photograph Reproduced Above Shows How a Patient is Securely Strapped to a Stretcher, the One at the Side Explains How, After This Operation is Completed, He is Placed in the Body of the Plane and Made Ready for a Brief Flight over the Lines to Some Point Where He can Obtain Surgical Attention



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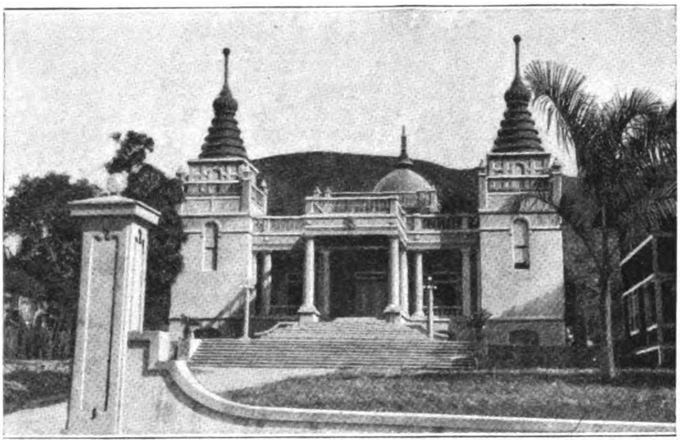
The French Were the First to Appreciate the Value of the Aeroplane as an Ambulance, and Likewise the First to Reverse the Plan by **Developing Flying Hospitals So That the Surgeon could be Carried to the Patient Instead of the Patient being Carried to the Surgeon**

COSTLY BUDDHIST TEMPLE ON AMERICAN SOIL

A Buddhist temple in Honolulu, costing $90,000, frequently excites the interest of visitors, for it is one of the very few houses of worship of this sort to be found under the American flag. It is said to be the only Buddhist temple which is built of reinforced concrete. Local Japanese contributed the funds for its construction.



This $90,000 Buddhist Temple, at Honolulu, Is an Object of Unusual Interest Because It Is One of the Few Houses of Worship of This Sort under the American Flag, and is Said to Be the Only One Built of Concrete

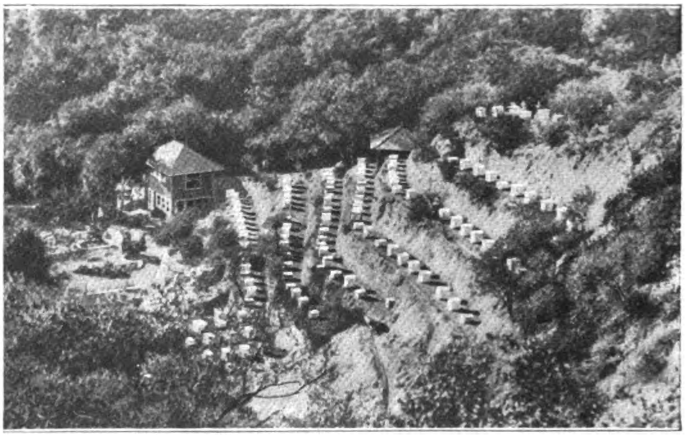
ELECTRIC DEVICE MEASURES HEAT LOST VIA CHIMNEYS

An ingenious device has been invented for measuring the heat that passes up a chimney and so is lost. In working out the problem, it was assumed that the heat carried off is directly proportional to the difference between the temperature of the outside air and of the flue, and inversely proportional to the percentage of carbon dioxide, measured by volume, in the escaping gases. The difference in temperature is measured by an electric device known as a thermocouple, while the amount of carbon dioxide is ascertained by the change in the electrical resistance of a solution of caustic soda occasioned by the absorption of the carbon dioxide and the production of sodium carbonate.

ℭCertain old warships owned by Venezuela, Colombia, Argentina, as well as one owned by the British, have been successfully transformed into cargo carriers.

BIG APIARY ON TERRACED MOUNTAIN SIDE

Beekeepers in mountainous regions in the West have learned that while many steep slopes are almost inaccessible, they offer ideal locations for apiaries. An excellent example of a precipitous mountain side utilized in this way is shown herewith. The slope has been cut into terraces 12 to 15 ft. high, on which more than 300 swarms of bees are housed, each hive being placed on a concrete foundation. The land put to this profitable use would be worth little for any other purpose. The hives, being high up, are fanned by the summer breezes and are warmed by the sun in winter, the slope having a favorable aspect and being sheltered by adjoining hills.



Slope Too Steep for Ordinary Cultivation, Which Makes an Ideal Location for an Apiary: Each Hive Rests on a Concrete Foundation, and There Are Some 300 of Them in This Colony

SUPPLY TRAINS AT FRONT MADE UP UNIFORMLY

In providing transportation for the enormous amount of supplies needed by American forces at the front it was necessary for the military railroad authorities to work out a system of making up trains which required a minimum of supervision and would be absolutely uniform day after day. At the time when fighting was still in progress 15 of these "automatic trains," as they were called, were started each day for their respective destinations. Each was made up of 50 cars. Undoubtedly a similar system of operation has been employed more recently in supplying our forces of occupation with food, clothing, fuel, and so on. The village which served as the railway headquarters had to be provided with 72 miles of yard tracking to take care of the cars used. The population has increased tenfold.

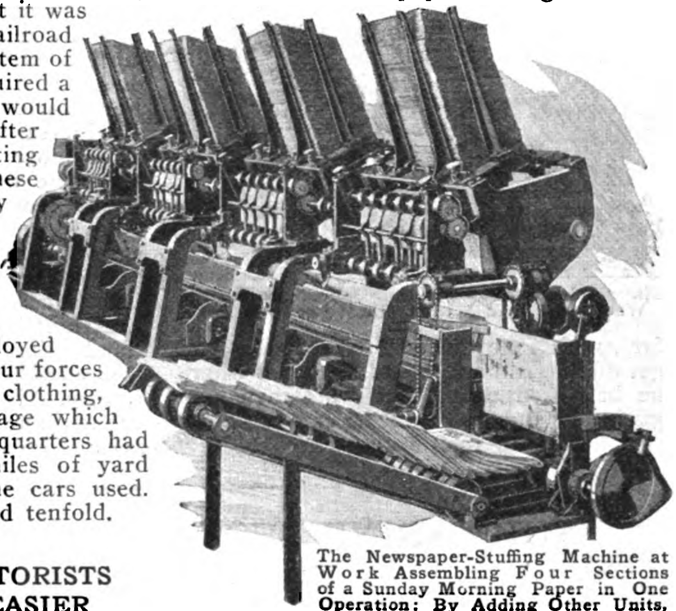
FOOT REST FOR MOTORISTS MAKES CONTROL EASIER

An automobile accessory which will be appreciated particularly by motorists who sit long at the steering wheel, is a rubber-bound foot rest intended to be screwed to the car floor just back of the accelerator. It can be adjusted to hold the driver's foot at the proper height with respect to the accelerator, and in case the car strikes a bump, it prevents accidental pressure on the control. It also relieves the muscles of the leg from tension due to holding the ball of the foot continually in an upraised position.

¶The government has taken possession of and now controls all marine-cable systems owned or operated by American concerns. This includes several transatlantic cables, one 10,000 miles long extending to China, one extending from New York through the Panama Canal and down the west coast of South America, and several others.

NEWSPAPER-STUFFING MACHINE ELIMINATES HANDWORK

Considerable interest is being manifested in a newspaper-stuffing machine that is reported to accomplish the work of a dozen or more persons. The task of assembling the several sections of the bulky Sunday morning and special editions of metropolitan newspapers has always been a manual operation that has called for the weekly employment of much extra help. The new machine consists of a series of connected units. A four-head apparatus, intended for handling a four-section paper, assembles 28,000 sections into 7,000 complete newspapers in one hour. By adding two more units of the apparatus, for instance, provision is made for stuffing six sections in a single operation. In practical use, it has been demonstrated that the machine soils or tears less than one newspaper in a thousand. In the event that the mechanism feeds two sections at once, or fails to insert a section, the machine stops automatically.



The Newspaper-Stuffing Machine at Work Assembling Four Sections of a Sunday Morning Paper in One Operation: By Adding Other Units, the Capacity of the Apparatus is Increased to Accommodate as Many Sections as may be Desired

INDIANS, BOYLIKE, BEG RIDES FROM MOTORISTS

One of the typical outcroppings of the boyishness in the character of the average primitive Indian, in New Mexico and elsewhere in the Southwest, is his fondness for taking short rides in passing automobiles. Many drivers obtain quite as much pleasure in taking on one of these silent, dark-skinned passengers as the latter does in riding at good speed. Having ridden as far as his fancy dictates, the Indian will get off the running board, if that is where he has been riding, utter his thanks in gutturals, and wait until he can flag a car that will take him back.

Motorist in the Southwest and One of the Indians Who Asked for a Ride for Himself and His Dog

LOCOMOTIVE OUTPUT DOUBLED UNDER STRESS OF WAR

One of the most remarkable achievements in speeding up industry to meet the war's demands is to be found in the record of manufacturers of standard-gauge locomotives in this country, made under the direction of the War Industries Board. For a period of several months the output was increased approximately 100 per cent. Even more striking is the fact that this was done without spending a single dollar to increase manufacturing facilities. Orders were redistributed among the various plants in a way which permitted each concern to concentrate on particular types of locomotives. Furthermore the "Pershing" engine, as it is called, was a standardized machine which was the sole type employed by the American forces in France. It was also adopted by the French and British with a consequent saving in time and money.

SUBMARINE SPOTTING FROM THE AIR

By HENRY A. BRUNO, Late of R. F. C.

SUBMARINE hunting was a fascinating war sport if one was on a patrol boat or fast torpedo-boat destroyer, but it was doubly so if the hunt took place in the air in a big naval seaplane. In order successfully to discover the underwater boats a definite campaign must be carried out with all units coöperating.

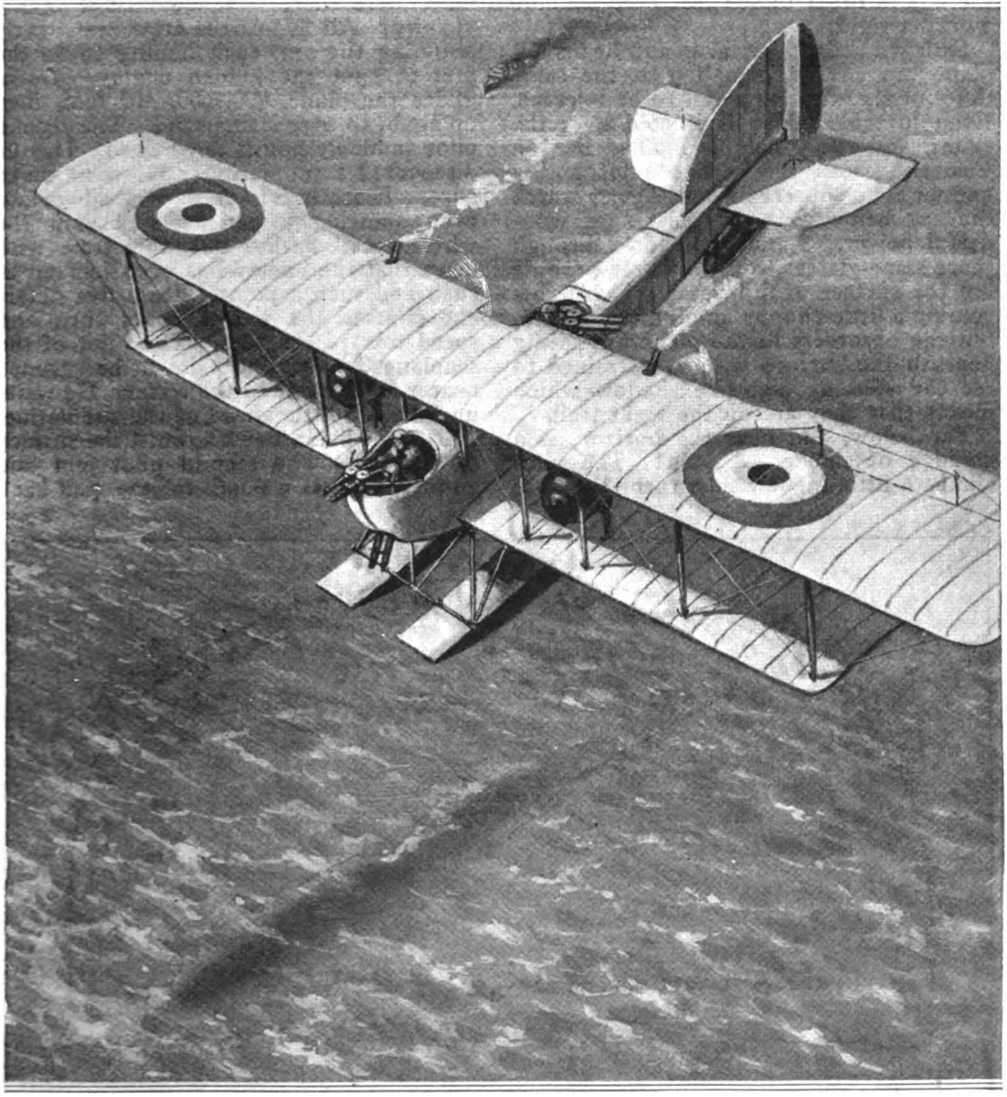
The planes used in this kind of work differ a great deal from those used on land and also from the ordinary naval hydroplanes. The H. P. B. 800 hp. was the favorite type. This is a large five-man seaplane, equipped with two 400-hp. motors. It is well armed with six machine guns, coupled two together. Four of these guns are American Lewis, one set of two being placed in the front of the plane on the projecting nacelle and the others in the rear of the main planes, allowing an arc of fire over and above the tail. The remaining two are British Vickers, pointing downward through the floor of the front part of the nacelle or fuselage, thus enabling the gunner to sweep the sea below with a hail of fire. Six or more H. E. depth bombs operated by an accurate trigger and bomb sight complete the armament. A pilot, second pilot, two gunners, and a first-class mechanician composed the crew. Being a pusher, there are no whirling propeller blades to interfere with quick maneuvering of the guns, and a clear view ahead is always obtained.

To understand just how exciting submarine spotting really was, it will be necessary for me to transport you to an isolated spot on the coast of Northumberland, in the north of England. Hidden in a small bay, and cleverly camouflaged, are several large hangars with runways leading into the water. It is almost daylight and one of the seaplanes is pushed out of its hangar and is soon resting on the water.

While the mechanicians are busy removing the covers of the huge twin motors, other willing assistants are fastening the machine guns to their supports on the nacelle. Guns are never left on a plane while it is off duty. Each one is taken to the gunnery shed and thoroughly cleaned and oiled. The two pilots appear, both sleepily rubbing their eyes, and are soon joined by the rest of the crew. But the plane is not yet ready. The wireless transmitter does not give out a fat enough spark, so a new apparatus is installed. Wireless played an important part in this work and a badly operating instrument might allow a submarine to get away. The bombs and containers of ammunition for the guns were placed aboard before the plane left the hangar, and as the chief mechanician signals O. K., the crew climbs aboard. The chief pilot has a map which shows the area over which he is to fly, also at what points he will find patrol and other allied boats, all ready to coöperate in catching a submarine.

Each section of the North Sea was divided into areas, and had a certain number of allied boats operating in it, all of which were known to the pilot before he started. These boats had distinguishing marks easily visible from a great height in the air, and seaplane pilots would attack any strange boat in the area of patrol. Several submarine mother ships were discovered by this plan and, needless to say, they never returned to their base.

The seaplane's powerful motors come to life with a roar, which is quickly silenced as the new muffling attachment is thrown on. While no means have as yet been found to make aeroplane motors absolutely noiseless, the Royal Naval Air Service planes have a device which cuts down the noise almost three-quarters.



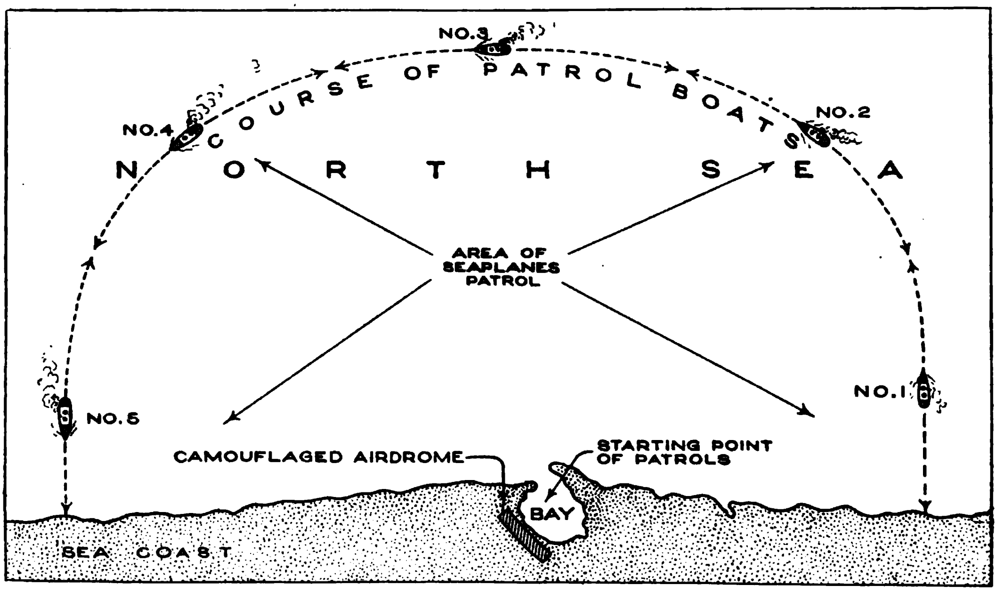
"There it is! A dark shadow not even showing a periscope. Again the wireless call flashes out, this time with news that the enemy has been located at such and such a point. From five different courses the patrol boats turn and speed toward the spot. The pilot of the seaplane is not idle; down he swoops nearer and nearer to the water."

The first rays of the rising sun catch the weird coloring on the plane's wings, which are camouflaged so as to make the machine almost invisible at a certain height. Obedient to a wave of the pilot's hand, the mechanicians stand clear and the plane glides out over the smooth waters of the bay, rising into the air in an incredibly short time. Although very large, these planes will make 120 miles an hour, are very stable, and easily handled both on sea and in their natural element, the air. The pilot climbs slowly until he is about 1,800 feet, then circles twice over the bay in order to see that everything is working right.

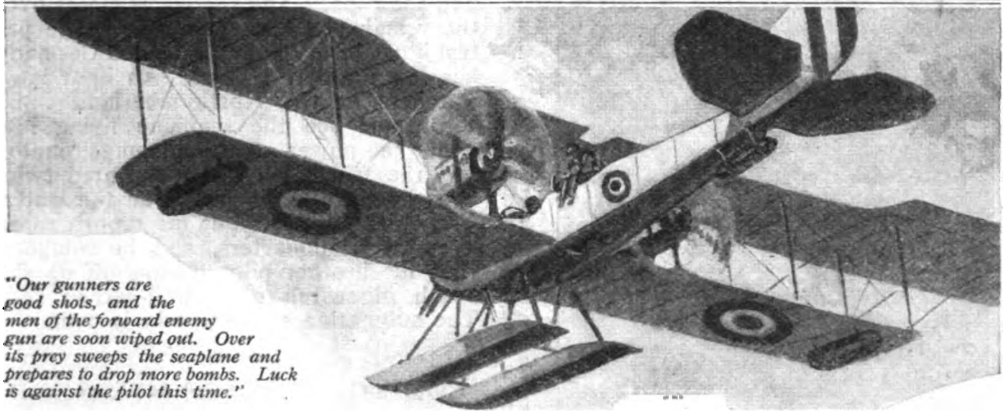
Satisfied at last, he turns and heads the plane out to sea, signaling at the same time for the wireless aerial to be released. Even in midsummer it is cold over the water, and every man is muffled like an Eskimo. Both the second pilot and a gunner act as observers and eagerly watch the sea below through glasses of wonderful power. Should you look through those same glasses, you would see nothing but the surface of the water, which is becoming a little choppy under a stiff breeze, but the observers in the plane are seeing beneath the surface with eyes trained to see the slinking cigarlike shadow which means that they are on the right trail.

Far below, and near the horizon, is a smudge of smoke. A ship! The pilot climbs a little higher, then turns the nose of the plane straight for the distant object. A few minutes later, H. M. torpedo-boat destroyer "87," seeing the circling plane, breaks out the agreed signal and immediately the wireless on the seaplane is flashing down the "all clear" message. Banking steeply, the pilot heads off in another direction, and four times in the next half hour picks up the patrol boats assigned to his area. Each boat has a certain course to patrol and the seaplane keeps in touch with each one, ready to signal when the prey is found.

The plane is well out of sight of land now. Are there any submarines in the vicinity? All five of the crew are eagerly scanning the sea, each hoping to be the first to spot the hidden enemy. Down glides the plane, 800, 600, 400 feet, then up again to over a thousand. The second pilot suddenly points downward. Has he discovered a submarine? He must make sure. There it is! A dark shadow, not even showing a periscope. Again the wireless call flashes out, this time with news that the enemy has been located at such and such a point. From five different courses the patrol boats turn and speed toward the spot. The pilot of the seaplane is not idle; down he swoops nearer and nearer to the water. He waits until he is a little ahead of the submarine, then dives like a hawk toward the surface of the sea. The second pilot and one gunner, each at a bomb release, pull back

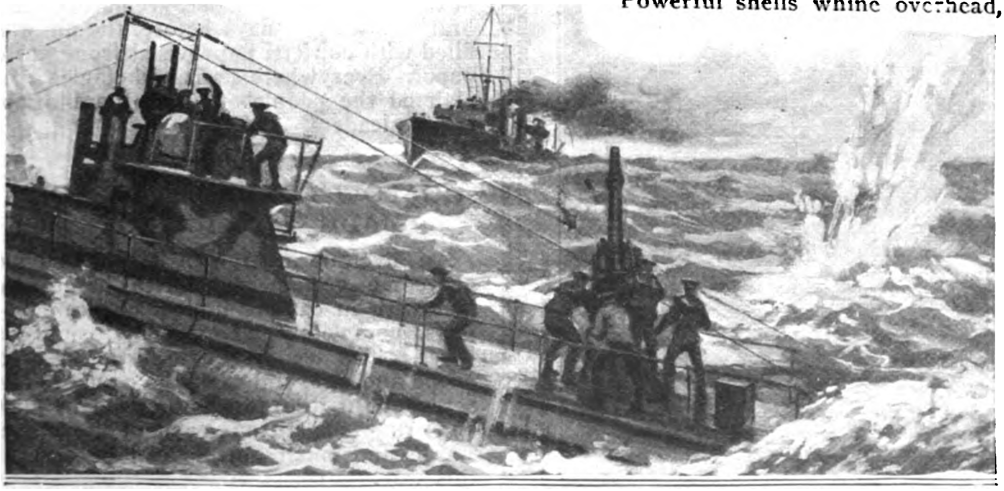


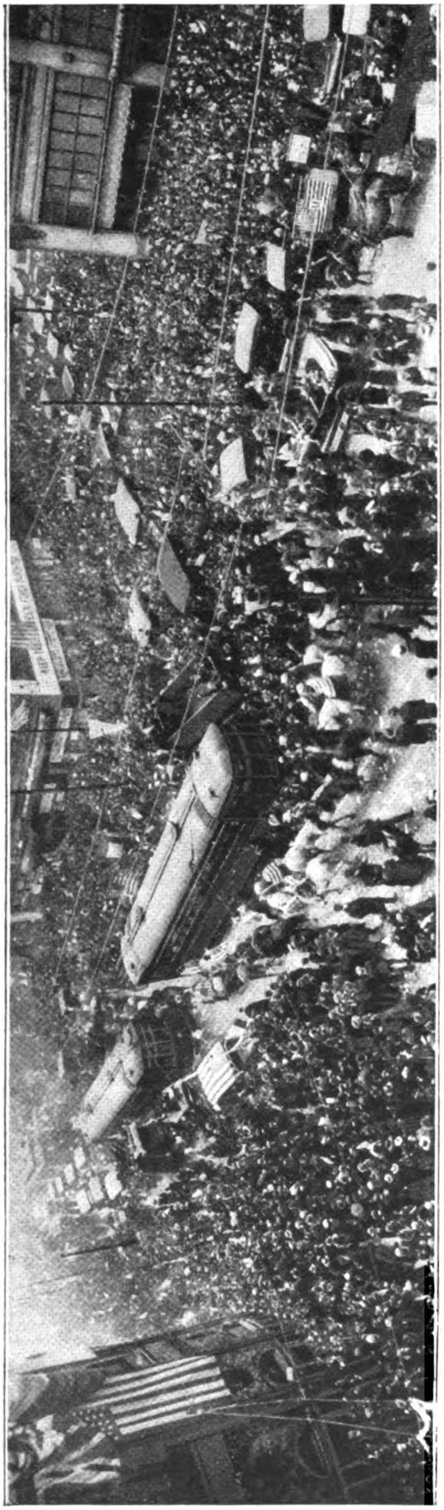
Plan View of Coast and North Sea Showing How an Area is Patrolled by Ships and Seaplanes: Once inside This Area a Submarine Is Almost Sure to be Discovered and Sunk



"Our gunners are good shots, and the men of the forward enemy gun are soon wiped out. Over its prey sweeps the seaplane and prepares to drop more bombs. Luck is against the pilot this time."

the levers and two depth bombs drop like plummets. A quick bank and the plane rocks from the explosion; then, with the motor throttled, the machine dashes down in a nose dive. No, the pilot is not hit by his own bombs; he wants to observe the damage done. Up from the depths comes the submarine, a big one, rolling like a log and evidently badly holed. Men appear on its deck, hastily manning two guns which have appeared out of the hull. Despite the fact that they are having a hard time to keep their footing, they commence firing at the huge bird which has routed them from the very depths of the sea. A shell bursts near the plane; then another. The pilot climbs swiftly, banks almost vertically, then dives again, and this time the machine guns begin to add their staccato reports to the noise of the larger guns on the submarine. Our gunners are good shots, and the men of the forward enemy gun are soon wiped out. Over its prey speeds the seaplane and prepares to drop more bombs. Luck is against the pilot this time; a shell bursts too close, the right motor sputters, and stops despite the efforts of the mechanician. The plane wavers, then starts to glide down. A wobbly glide indeed, reminding one of a wounded duck. With a splash it pancakes into the water and hardly has it settled before shells from the sinking submarine's remaining gun commence dropping near by. Help is at hand, however. Powerful shells whine overhead,





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Part of the Throng of a Million or More Exulting Americans Who Filled the Streets of Chicago's Loop throughout "Victory Day": Never has the City Seen Such a Stupendous Manifestation of Patriotism and Joy and Never did the People Express Their Feeling in Such a Variety of Ways

find their mark, and the water closes over the remains of the submarine. The patrol boats have come in time and Germany has lost another U-boat. An hour later watchers at the Northumberland coast aerodrome see the seaplane flying low under the power of its undamaged motor and the feeble help of its injured twin, and shortly after it settles on the water. The chief pilot fills out his report, turns it in at headquarters, and in company with his brother pilot tramps off up the beach in search of a well-earned rest. The submarine spotting trip is over.

COMING OF PEACE HERALDED BY UNPRECEDENTED SCENES

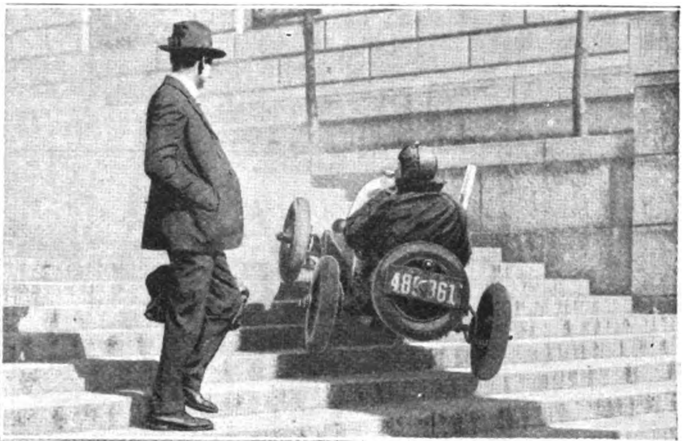
For giving expression to the wild joy and the deep thankfulness which swept over America on November 11 at the announcement "Germany surrenders!" no formal demonstrations could have been adequate. In the enthusiasm of those first hours of peace, men, women, and children rushed into the streets and mingled their shouts in a delirium of exultation that no participant will forget. In New York, Chicago, and other large cities the celebrations were of unprecedented magnitude, all the streets in the business districts for many blocks being filled with the surging multitudes. But in every smaller city, village, and hamlet the same high pitch of enthusiasm was reached. Bands played, and were drowned out by the shrill horns of those about them. Automobiles, trucks, and street cars were crowded with uninvited, but welcome passengers, and passed at a snail's pace through the throngs. As in the case of the smaller, premature celebration of a few days before, the air was filled with confetti improvised from waste paper. Everywhere signs and effigies proclaimed the people's scorn of militarism and its leaders.

HOLLOW CONCRETE CASTINGS MADE WITH ICE CORES

An inventor in Munich is said to have overcome certain difficulties heretofore met with in casting hollow concrete objects, completely inclosed, by using ice cores. The ice is cut into the desired shape and size, and after the concrete has set about it, the core is allowed to melt and run out through small openings. Large and small objects can be cast in this way.

INFANT MOTOR CAR CLIMBS BOSTON CAPITOL STEPS

After making a seven-hour trip from New York to Boston, a mosquito-sized motor car recently astonished a crowd of onlookers by crawling up the steps of the statehouse in the latter city. The machine, built on the lines of a racing car, is equipped with a capable motor that drives it at high speed and endows it with adequate power for spectacular grade-climbing feats. Although only broad enough to receive the driver, the tiny car is fitted on the right side with an outboard seat for a passenger.



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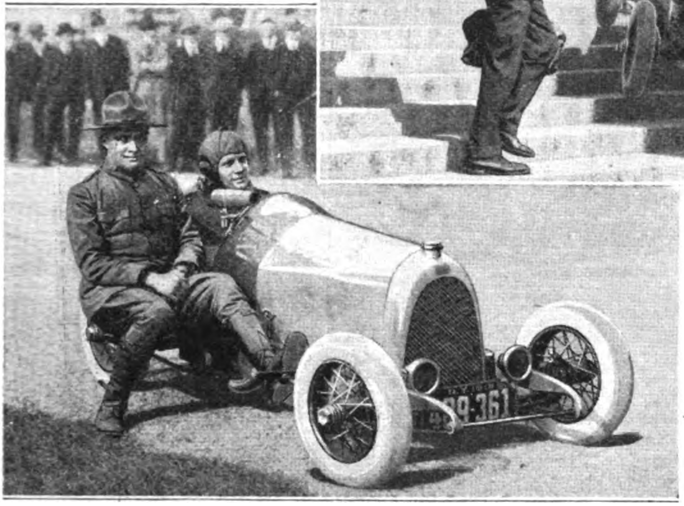
One of the Car's First Capers, upon Reaching Boston, Was to Scamper up the Steps of the State Capitol by Way of Demonstrating Its Hill-Climbing Power



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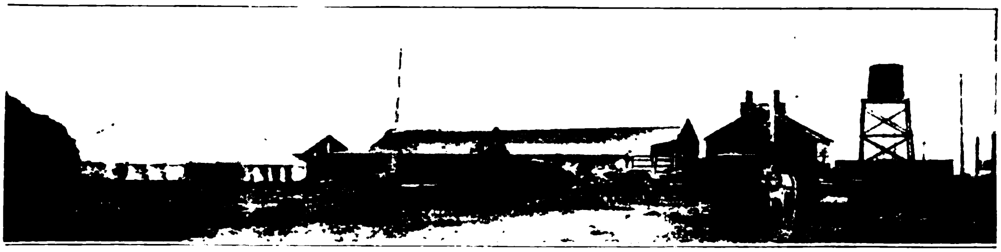
The Motor Car of Itself Is Large Enough to Accommodate Only the Driver, but an Outboard Seat on the Right Side Enables One Passenger to be Carried

BIG CIRCUS TENTS SHELTER FEED DEALER'S SURPLUS

The shortage of freight cars. prevalent some time ago, placed a large western dealer in feeds in a serious predicament because his storage facilities were insufficient to care for the quantities of material which accumulated because of inadequate shipping facilities. The difficulty was solved by procuring five large tents from a circus which was wintering near by. In these big, white shelters about 20,000 tons of feed were protected from the weather.

¶The shipping board has been authorized to commandeer boilers or other machinery that may be needed to quickly outfit a vessel just launched.



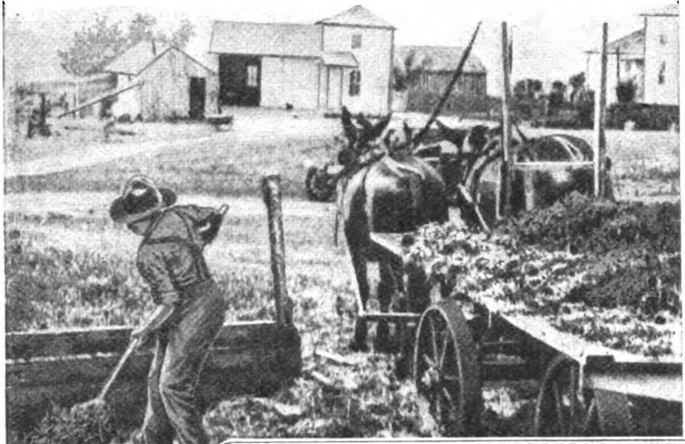
View of Feed Dealer's Establishment. Showing One of Five Circus Tents Which He Procured to Shelter Accumulated Hay, and the Like, Until Cars could be Obtained for Its Shipment

CHICAGO BOYS

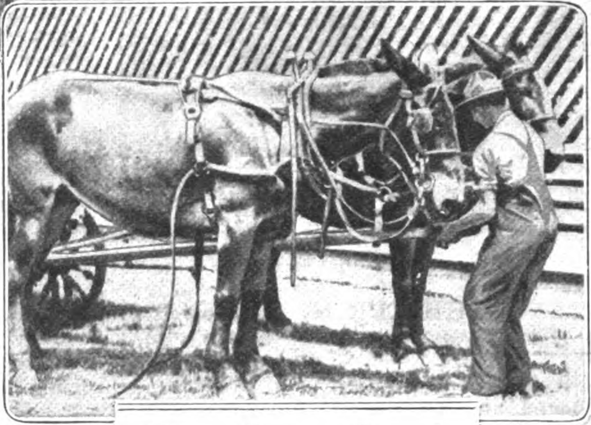
Schools Make Vacant Tracts Farms and Send Eager Lads

By JOHN

AN agricultural high school for several hundred city boys, on a real farm of 640 acres within city limits, is the educational innovation which has been determined upon by Chicago's school authorities. The movement, of which this is an outstanding feature, has already resulted in supplying hundreds of farm hands from the ranks of flat and tenement dwellers and in training boys in scientific agriculture on various unimproved tracts of city land.



Some of the Hard Work That Gave the Boys Appetites and Strength They had Not Known in the City



How to Harness a Team of Mules Was Quite Bewildering at First

The whole undertaking on the part of the Chicago authorities promises to be one of the biggest boosts ever given the back-to-the-land movement. While others have sought to induce mature workers to give up city life for the country, by this plan the city boy is taught the ways of the farm before his habits are fixed and before his trade or profession is selected.

Boys from two Chicago high schools spent the past summer operating an 80-acre "farm" near the northwestern limits of the city. One group devoted mornings and the other afternoons to plowing and planting this land, a farm tractor being part of the equipment provided. The boys received school credits for their work, which was done under a competent instructor. Many of them enthusiastically continued their work through the summer and fall, harvesting the crops in good style, and showing marked improvement. Operating the tractor was especially enjoyed.

The success of this experiment has encouraged the authorities to select, tentatively, a square mile of school land in the southwest section of the city where it is proposed to erect a splendidly equipped agricultural high school. Until conditions make such an im-

BY COURTESY OF HENDERSON FILMS, INC.

Every Boy is Learning to "Hoe His Own Row" in a Literal Sense and He may Some Day Find His Knowledge of Much Value

BECOME FARMERS

within City Limits into Real to Work in the Country

ANSON FORD

provement possible, Chicago south-side schools near the tract will undertake its cultivation, following the plan already indicated. If practicable, barracks may be erected here where boys can live at certain times of the year under a system of instruction which will include military training as well as farming. Fall plowing has already been done on a 150-acre tract in another section of the city, and some twoscore boys on the city's west side are becoming embryo farmers.

Another phase of the Chicago schools' new interest in agriculture, supplementing the instruction on city farms, has been the sending of hundreds of boys into the country as farm hands, under the supervision of the school authorities. In the spring of 1917, 700, out of 1,500 boys who made applications, were sent to the country and earned a total of $42,583. The lads made good, though some of them were "so green that the cows almost ate them," to use one boy's expression.

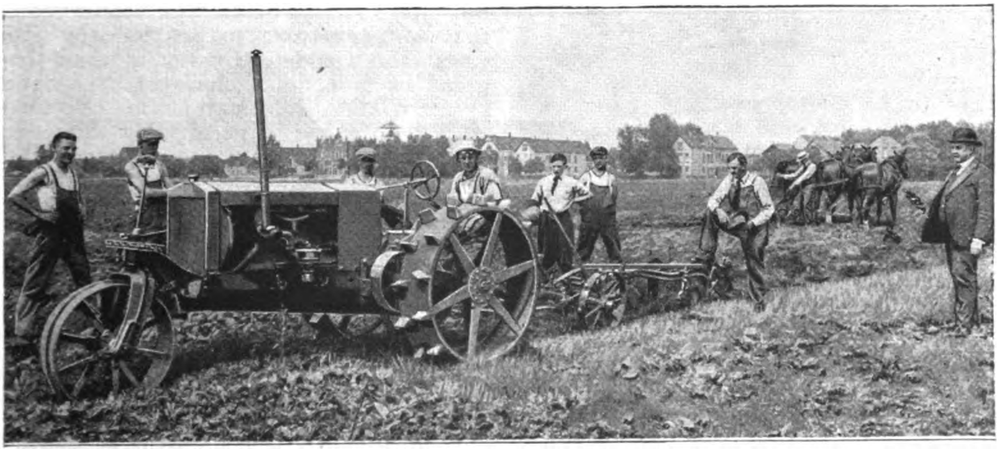
Each boy, on returning to school, brought an affidavit from his farmer employer in which the latter stated the character of his helper's work. Less than a dozen classed the labor as unsatisfactory. Many of those who went last year were coached before leaving so that they knew something about hitching up horses, handling planters, cultivators, etc. The amount earned by the boys the second summer was approximately $150,000. This second group was asked by Dudley Grant Hays, who was the director in charge of the work, to report on the character of the treatment

BY COURTESY OF HENDERSON FILMS, INC.

Movie Glimpses of Chicago Boys Learning Fence Building

BY COURTESY OF HENDERSON FILMS, INC.

Lads Raised in Flats and Tenements Studying Field Corn



High-School Boys Breaking Ground on the 80-Acre "Farm" in the Northwest Part of the City: Groups from Two Schools Planted, Cultivated, and Harvested Crops Here given them by the farmers. With very few exceptions the comment of the boys was, "Fine!" and some of them took pains to add other words of appreciation that would have done their new country friends good.

A large number of these city-bred farm hands and workers on the schools' own farming tracts are determined to take up farming as a livelihood. The farm-employment service has been incorporated into the United States Boys' Working Reserve, a movement national in its scope, which has profited immensely by the pioneering which Chicago has done in this field. Within a short time farming will be brought to many cities, as it has been to Chicago, and thousands of lads from various cities will be sent to farms. In this way a great new impulse of a most practical character is being given to the back-to-the-land movement.

CLIMBS TO SKYSCRAPER ROOF TO ADVERTISE WAR FUND

Of the many spectacular feats employed to advertise the United War Work campaign, none caused more spectators to gasp with astonishment than that of an acrobat who climbed a rope stretched from the ground to the top of one of New York's tallest skyscrapers. By means of a clamp with horizontal foot rests, to which his feet were strapped, and a gripping member fastened to a belt about his chest, the performer was able to draw himself up with apparent ease.

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Acrobat Equipped with Special Climbing Apparatus, Ascending to the Roof of a New York Skyscraper: This View Shows Him Passing the 28th Story

SOLDIERS IN OVERLAND RACE WIN RICH CANADIAN PRIZE

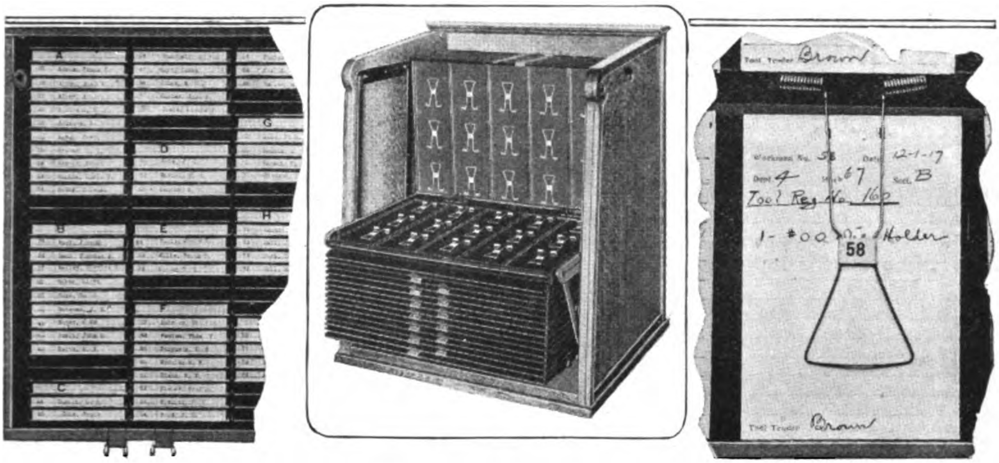
The prize for an overland race which was recently won by 16 Canadian returned soldiers, in competition with several representatives of moneyed interests and a railway, was certain newly discovered deposits of sulphate of potash in the dry bed of Inglebright Lake, Saskatchewan. These deposits may prove to be worth millions of dollars. Their discovery came to the attention of several persons, including the soldiers, at about the same time, and immediately a rush was made to see who could reach them first. The former fighters hastened across the plains by automobile and, arriving on the scene before all others, staked out their claims. Their competitors were only a few minutes behind them, but it is not thought the winners' claims will be contested.

COAST SURVEY TO HAVE TWO NEW BOATS

So many wrecks have taken place in uncharted Alaskan waters in recent years that soundings are to be made by the Coast and Geodetic Survey in these regions in order that mariners may have more reliable information in selecting routes. For use in performing this task and similar work on the southern Pacific coast, it is announced that two ships costing $400,000 each will be built by the Shipping Board.

TOOL-RECORD FILE FOR SHOPS PREVENTS CARELESSNESS

With a view to preventing losses due to careless handling of tools in machine shops, etc., a tool-record system has been devised which provides complete information at all times as to the tools in use and those in the stock room. The equip-



Outfit for Keeping Track of Shop Tools: At the Left Is the Alphabetical Index of Employes' Names Showing Their Respective Numbers. The Cabinet in Which the Memorandum Slips are Kept is Shown in the Center, and One of the Spring Clips, with a Slip beneath It,-is Pictured at the Right

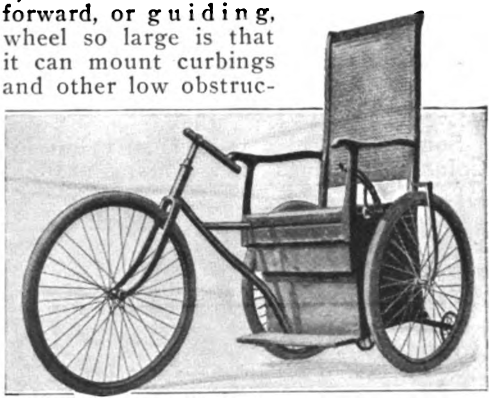
ment used consists of a cabinet having a series of hinged leaves to which spring clips are attached. One set of these clips is numbered to correspond with numbers assigned to the workmen, and the other is numbered according to the numbers assigned to the tools. When a workman procures a tool a triplicate record is made showing his name and number, the number of the tool, and the department in which it is to be used. One slip is placed under the clip assigned to the employe, another under that assigned to the tool, and the third is given to the workman, to be kept in a holder until it and the tool are returned. The file shows at a glance just where each tool is and furnishes a record which reduces errors to a minimum.

WAR-SAVINGS MOVEMENT ON PERMANENT BASIS

The war-savings campaign has attained such great success in teaching thrift to many persons who were extravagant and wasteful, that the government has decided to put the war-savings movement on a permanent basis. In Illinois, for example, the campaign for 1919 will be under the supervision of the Federal Reserve Bank of the seventh district. What is known as a war-loan board will offer war-savings stamps, together with Liberty bonds and treasury certificates. The stamps for the current year will be blue so that they can be distinguished from previous issues, and in size they will be slightly smaller. Thrift stamps and thrift cards will continue in use as heretofore.

NEW TYPE OF WHEEL CHAIR IS MOTOR-DRIVEN

An electrically driven wheel chair is a recent invention designed to make invalids more independent of attendants. In a case beneath the seat is a storage battery which drives a motor connected by gearing with the axle, while a lever attached to the left arm gives the occupant full control of the speed. The three wheels in size and design resemble bicycle wheels. The reason for making the forward, or guiding, wheel so large is that it can mount curbings and other low obstructions more easily than one of small diameter.



Wheel Chair Driven by Storage Battery Installed below the Seat: The Front Wheel Is Large in Order That It may Easily Pass over Low Obstructions

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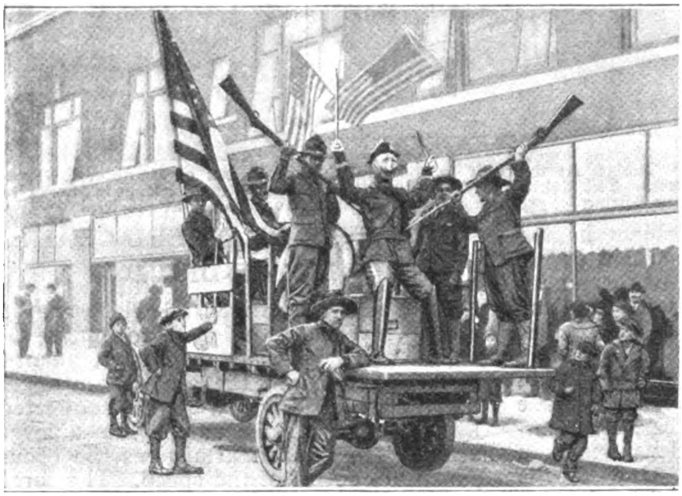
ℭBecause of the scarcity of shipping facilities for carrying petroleum from certain oil-producing districts in Mexico, an effort is being made to have it shipped to the United States by rail in much greater quantities than heretofore.

"KAISER" CENTRAL FIGURE IN VICTORY FLOAT

Inspired by victory, many an American early in November found himself suddenly possessed of ability in the plastic art—at least ability sufficient to permit the fashioning of unmistakable effigies of the allied world's archenemy. One such product of the amateur figure makers, shown herewith, depicted the former German war lord holding parts of a broken sword in hands upraised kamerad-fashion. The effigy was made of plaster of Paris, sticks, excelsior, and an improvised uniform, and was completed in five hours.



How Enthusiastic Patriots in Mitchell, South Dakota, Celebrated Victory over the Huns: The Figure was Fashioned in Five Hours

DAMAGED BOAT, WELL LOADED, TOWED TO PORT, BOTTOM UP

To the list of strange happenings at sea during the war may now be added an account of a schooner, loaded with salt herring, which was torpedoed not long since by a German submarine. The owners assumed that the vessel and its valuable cargo were lost. It developed, however, that though the craft was capsized by the torpedo both it and the barrels of fish which it contained were saved and damaged but little. Instead of sinking, the schooner remained afloat upside down, and in that position was towed into a Canadian port. Eventually 80 per cent of the fish were recovered in perfect condition, and placed on the market.

DIVER WORKS IN RESERVOIR ON PIKES PEAK

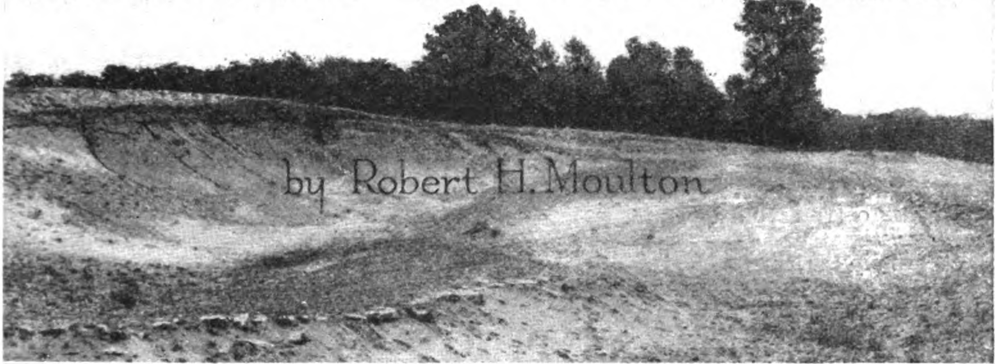
Some time ago a valve stem in one of Colorado Springs' reservoirs on Pikes Peak broke off and, as it was 40 ft. under water, it proved impracticable to repair it on account of the high price of divers' services. Recently, however, the city purchased a diving suit in which the superintendent of the water system descended into the ice-cold water and made the repair in seven minutes. Other owners of reservoirs in the region are now making requests for use of the suit to do similar repair work. Probably nowhere else in America is a diver's suit used at such altitude.

Plunge at High Altitude: Superintendent of Colorado Springs' Water System Descending in a Diving Suit into an Ice-Cold Reservoir on Pikes Peak to Repair a Valve Stem

¶A steel expert, following an investigation, has come to the conclusion that where the phosphorus in malleable cast iron reaches .2 per cent, or more, it has a deteriorating effect.

REPLANTING THE WAR FORESTS

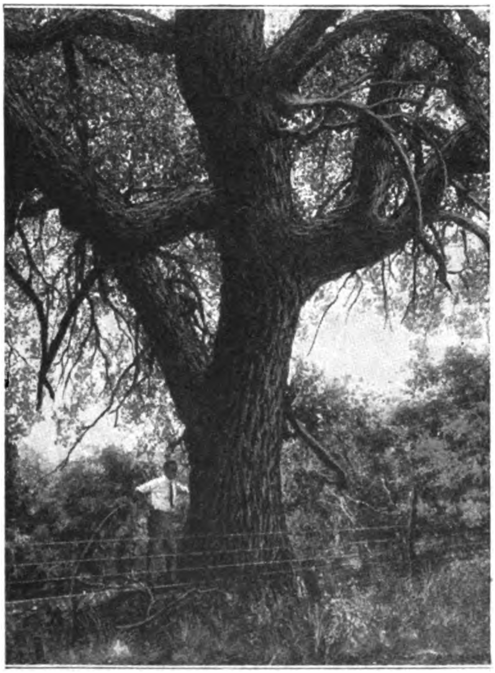
by Robert H. Moulton



One of the Few "Blowholes," or Regions of Shifting Sand, That Still Remain on an Illinois Farm: Numerous Similar Tracts have been Forested, as for Example the Land in the Background, and in That Way Adjoining Fields have been Saved from Inundation by the Sand

ENGLAND and Scotland are preparing to replant forests which have been cut to provide war supplies. They are not waiting until peace is concluded, but are doing it now. Never before have those countries been so bare of timber. Hunting ranges and sporting grounds have been sacrificed to supply munition factories at home and armies abroad. These forests were neither large nor many, but they were sufficient to tide over the time of peril. The replanting will involve certain changes.

The cutting is not yet all done, but plans for planting new forests are under way. The old forests were primarily ornamental and incidentally useful, but those which are now being deliberately provided for will be primarily useful and incidentally ornamental. This will conform to the spirit of the times after the war. Forests will no longer be planted and protected for the benefit of a few hunters and gentlemen of leisure, but will be made and maintained for the profit of the people as a whole and as delightful places of retreat from the dirt and noise of cities.



The Giant Cottonwood Tree, Self-Sown Decades Ago, Which Suggested to the Owner of the Steadily Enlarging Sand-Covered Tract, That a Large Number of Trees could be Made to Grow in This Soil and So Add to the Value of the Whole Farm

In the United States we are not in so much need of tree planting as they are in the British Isles. We have so much timber left that in most cases we cannot miss what the war has taken. We could fight on for 20 years and still have plenty of most kinds. But there are two kinds of timber which the war demand has greatly depleted, and they are kinds of much importance: locust and black walnut.

These were not abundant when the war began, and the demand has been extraordinarily heavy. The supply is now smaller than it ever was in the past. It would seem, therefore, that it would be good policy to do as they are now doing across the sea and take immediate measures for planting walnut and black locust. If these woods will never again be needed in war, as we all hope, they can be used in the industries of peace.

There is another point to be considered in the planting of these trees: They can be grown on sandy tracts of land which are now considered of no value, and thus reclaim this land. Still another point, and one of great importance, is the intimate relation that exists between forests and farms. As a matter of fact, the value of trees on a farm can hardly be overestimated.

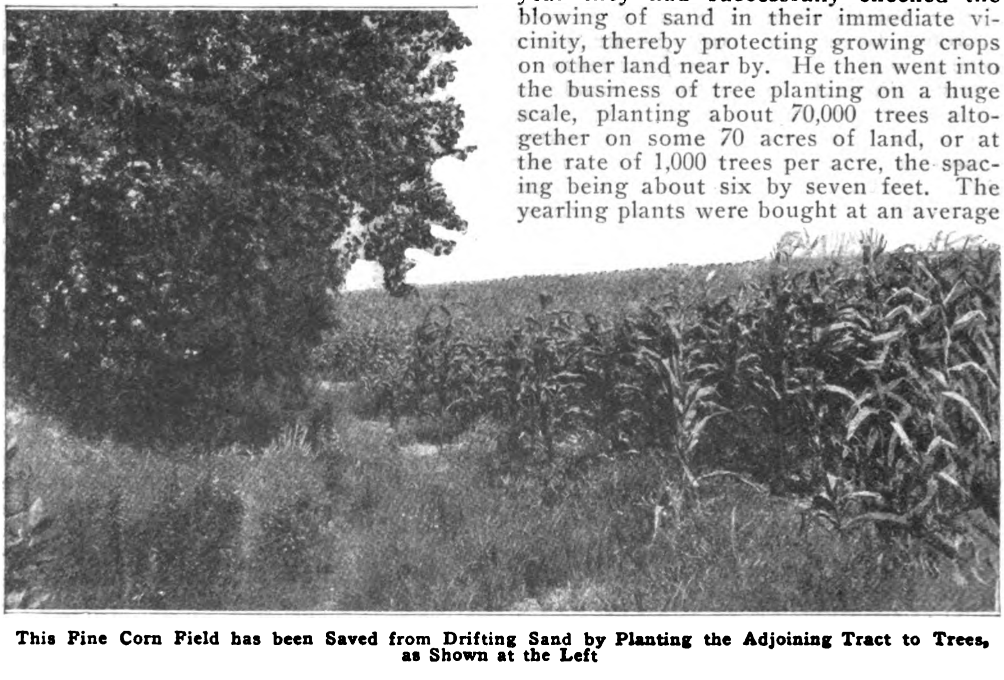
A principle that has been laid down by the wisest observers is that five per cent of the whole area of plains and prairie states should be put into trees. The forest waters the farm. This is a patent fact in all regions where irrigation is practiced; it is not less true in all the rest of the country, although it takes a little investigation to reveal the fact.

An excellent illustration of what can be accomplished in the way of reclaiming useless land through the planting of trees has been carried out during the last six or eight years by a resident of Whiteside County, Ill. In these years he has accomplished the seemingly impossible task of turning some 70 acres of sand, formerly as barren as the desert of Sahara, into a flourishing forest. Nor is that all; for this forest, acting as a sand binder, has been the means of saving other fertile acres from the inroads of the drifting sand, the total result being that the farm has increased several times in value. The sandy tracts, which, before being planted to trees, were practically worthless, are now worth anywhere from $50 to $100 an acre.

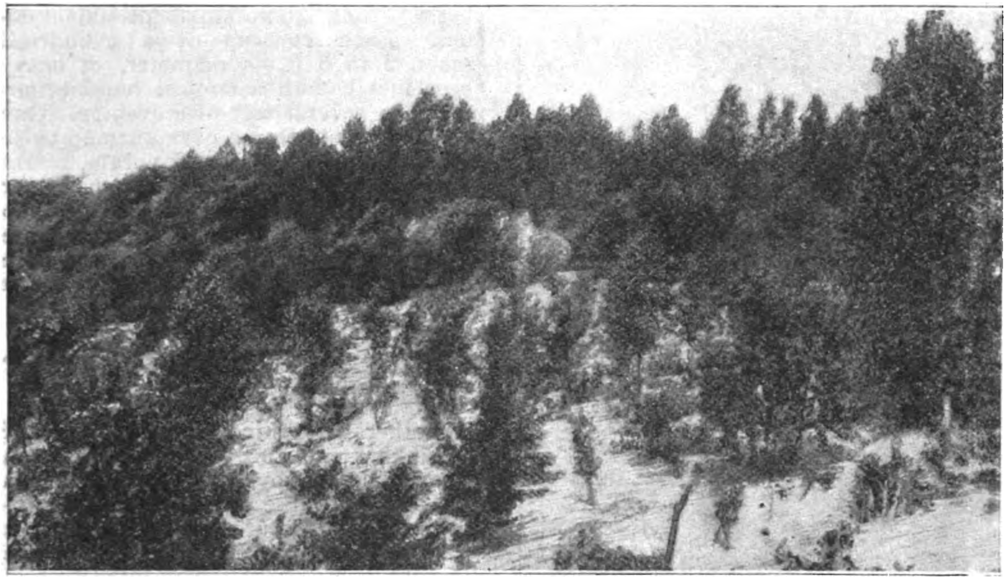
This farm lies on the edge of the so-called "bottoms," three or four miles east of the Mississippi River. When in geological ages, the channel of the Mississippi was changed, the sand in the old river bed was blown up on the east side of the river, forming many sandy tracts. In time these tracts became covered with a sparse growth of grass. Then in a dry season the grass was killed, and the sand began to blow about, covering everything in its course. Such was the situation when the present owner came into possession of his farm.

Being something of an enthusiast in afforestation, he determined to attempt the reclamation of the sand tracts on his farm. He was encouraged in the belief that trees could be made to grow there by the presence of one huge cottonwood tree standing almost in the middle of the tract. This tree also suggested certain species, such as black locust and walnut, which would most likely thrive in the sand.

The first year 5,000 yearling trees were planted and in a little over a year they were three or four feet high, and grass began to creep in between. In another year they had successfully checked the blowing of sand in their immediate vicinity, thereby protecting growing crops on other land near by. He then went into the business of tree planting on a huge scale, planting about 70,000 trees altogether on some 70 acres of land, or at the rate of 1,000 trees per acre, the spacing being about six by seven feet. The yearling plants were bought at an average



This Fine Corn Field has been Saved from Drifting Sand by Planting the Adjoining Tract to Trees, as Shown at the Left



A Thriving Forest of Walnuts and Black Locusts in the Midst of What Was Once a "Blowhole," Where the Temperature Reached 180° in Summer: Now, in Hot Weather, the Air Is Cool and Moist Because of the Evaporation from the Trees

price of $5 per thousand, and the cost of planting them was relatively small, since two men could easily plant 3,000 trees a day.

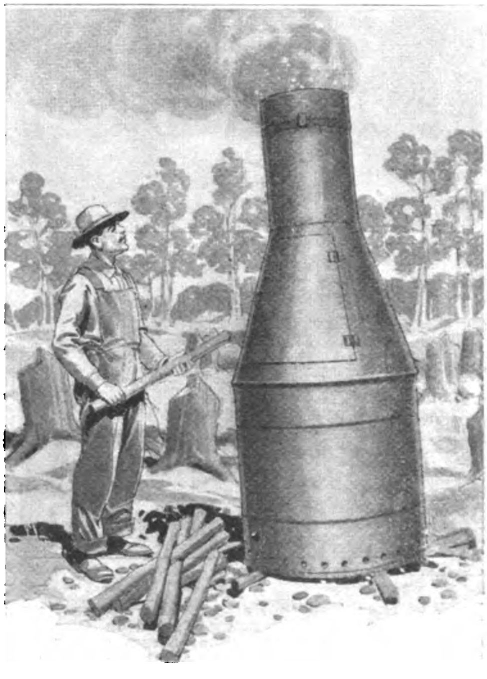
The rapidity with which the sand drifted in many places is well illustrated by some of the accompanying photographs which show the original fence posts, set before the tree planting began, almost entirely covered.

One blowhole was left unplanted, merely for the purpose of showing other farmers what can be accomplished in the way of reclaiming sandy tracts of land. This blowhole also shows, in a manner most unmistakable, how the trees serve to lower the temperature. On the day these photographs were taken, in mid-July, a test of the temperature in the blowhole indicated 115° F. (it has been known to go as high as 150°), while among the trees it was only 95°. This difference was due, in part, to the fact that trees drink in and transpire an enormous quantity of water, and this giving-off tempers the dryness of the near-by atmosphere.

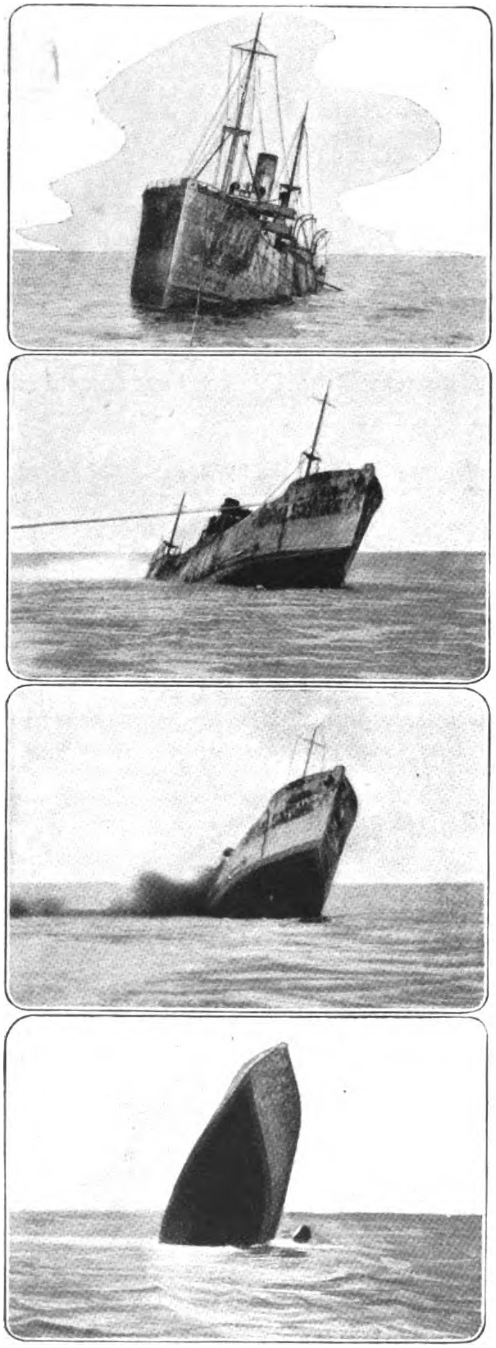
ℭThe Japanese government has established certain standards of quality which must be met by all articles in certain lines meant for the export trade. Matches, glassware, enameled ware, hosiery, and braid are now included in these regulations.

STUMP STOVE CLEARS LAND AT SMALL COST

Stumps on a large plantation in the South have been gotten rid of at small



One of the Sheet-Metal Stump Stoves Used in Clearing a Southern Plantation



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Reading from Top to Bottom, the Pictures Show: 1, the Torpedoed Ship being Towed in the Hope of Reaching Port; 2, Clouds of Steam Rising from the Engine Room, Indicating That the Inrushing Water has Reached the Fires; 3, The Tow Line having been Severed and Smoke Belching Forth; 4, Bound for "Davy Jones' Locker" with Bow High in Air

cost by using stump stoves of simple design. Each consists of a cylindrical jacket, 3 to 6 ft. in diameter, of heavy sheet metal, with a conical hood terminating in several feet of stovepipe. One of the stoves is placed over a stump to be removed and a fire lighted within, access to the interior being had through a door in the side. One stove can be used to burn out three stumps in a day. Since an attendant can care for a dozen or more fires, the cost of clearing the land is not large.

FOUNDERING VICTIM OF U-BOAT SHOWN IN PHOTOGRAPHS

Another interesting pictorial story of the sinking of a torpedoed merchantman under allied convoy in the Mediterranean Sea, is told by the accompanying photographs. The pictures were taken by a witness aboard another vessel, and give different glimpses of the ill-fated ship in its last minutes afloat. On occasions during the past four eventful years somewhat similar serial photographs have come to attention, but no doubt this is one of the last series of the kind that will be published in many days to come. The pictures show the torpedoed craft from the time it began to settle by the stern, until, with its bow high in the air, it began its final downward plunge.

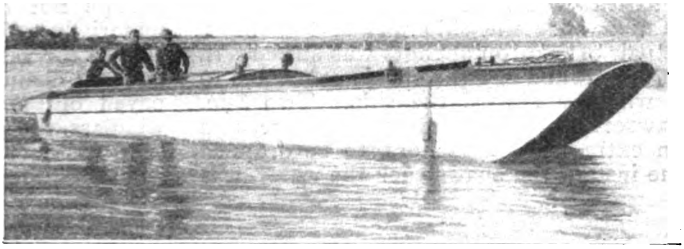
TO USE GREAT POWDER PLANT IN MAKING CHEMICALS

Officials in charge of constructing the great smokeless-powder plant at Nitro, W. Va., on which the government has been spending $51,000,000, announce that the end of the war does not mean this money has been wasted. The plant has been planned with a view to such a turn of events, so that in times of peace it can be devoted to the making of dyes and chemicals, a field in which the United States is to make a strong bid for supremacy. A force of about 24,000 men is required to operate the establishment at full capacity, which is 625,000 lb. of powder per day.

¶ Announcement has been made by the Medical Reserve Board of the Division of Military Aeronautics of the perfection of a practically nonshatterable substitute for glass, intended to be used in making lenses for airmen's goggles. The material is hard, noninflammable, and may be polished.

HIGH-SPEED SEA SLED IS FLIERS' LIFE-SAVER

A sea sled, capable of traveling 60 miles an hour, has been placed at the service of the government and already has done invaluable work in rescuing fliers who have fallen into Lake Worth, a body of water in Texas on which the craft is located. Airmen training in the vicinity of Fort Worth are required to do their difficult maneuvering, or "stunting" as it is called, above this lake, 30 miles long, and the sled, manned by a crew of three, follows them about or lies ready to come to the rescue in case of accident. Its high speed has enabled it to reach a number of fallen fliers in time to drag them from the water.



A Life-Saving Craft for Airmen: The Crew of This High-Speed Sea Sled Watch Fliers Practicing "Stunting" above Lake Worth, Texas, and Hasten to Their Rescue in Case They Fall

INGENIOUS METHODS USED IN LAUNCHING SHIP

Serious difficulties conspired to make the launching, some time ago, of the steamship "Beaumont," at Beaumont, Tex., more than ordinarily interesting. The vessel was built on ways laid at the greatest possible angle to the river's shore line. But even this arrangement gave only a 450-ft. stretch of open water. The boat measuring 270 ft. in length, the submerged ways, 130 ft., and shallow water usurping an additional 20 ft., meant that the boat could move ahead only 30 ft. after leaving the ways. These conditions made it patent that the vessel would have to be stopped immediately after slipping from the ways, and were of course given consideration at the outset when the latter were built.

Varied means were employed in solving the unusual problem. The keel was laid with a .625-in. grade and the stern set very low, while the

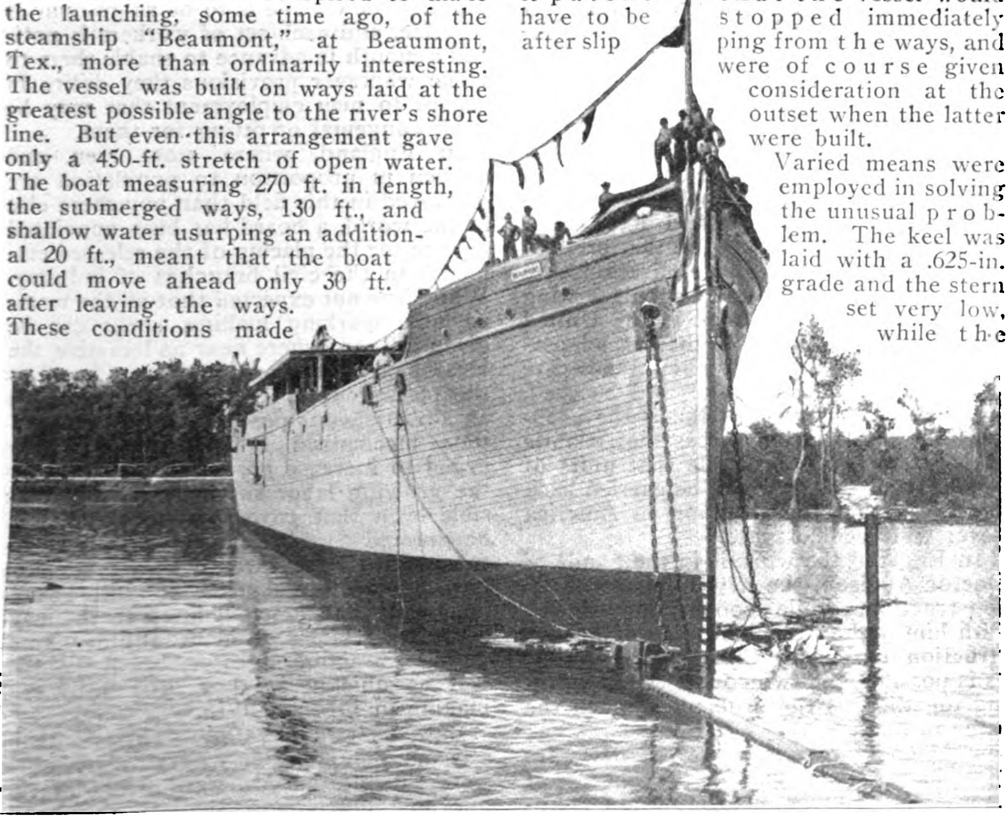


PHOTO BY COURTESY OF MAX HANSEN

The 270-Foot Wooden Steamship "Beaumont" Immediately after Its Successful but Difficult Launching in the River at Beaumont, Texas ways were built with a 12-in. crown. A large live-oak friction brake, with two 6-ft. wheels controlled by heavy steel bands, was made fast to the ship with a 2-in. steel cable. It was designed to be operated through a triple block by 10 men, and intended to slow the ship to a gradual standstill at the end of the ways. A bulkhead was built at the stern to retard motion once the ship was in the water. A pair of two-ton anchors was buried 8 ft. in the ground and the chains connected to a windlass aboard the ship. Two 3-in. hawsers were fastened to the shore, and an extra pair of anchors, to be dropped the instant the boat struck the water, was provided. When the launching was made the boat was stopped at the point previously contemplated. This was not done, however, without some of the plans going amiss in practice. The boat gained the undesired speed of 12 ft. a second in the first 150 ft., and when the brake was applied the 2-in. steel cable snapped, although not before the speed had been materially reduced. The stern bulkhead slowed the vessel still more, and when the anchor chains became taut and were payed out skillfully by the men at the windlass, the stop was made at the desired spot without the necessity of bringing the hawsers into use.

DISSOLVING A WORLD ARMY

By E. T. BRONSDON

TO return hundreds of thousands of honorably discharged combatants to peace-time occupations and conditions cannot fail to present a problem to any nation, no matter how prosperous. Demobilization, however, can hardly affect the United States, with her newly acquired merchant marine, her extended commercial interests, and her brand-new industrial pursuits, in the same degree as it must those countries which have been ravished and scourged by years of warfare. France and England have their plans well enough in hand so that preliminary rehearsals of the demobilization have taken place. It is too early at this writing to state what will be done in the United States, but it is probable that an adaptation of the same scheme which takes care of Tommy and the "poilu" will be used. With the Yankees there first is the problem of transportation across the Atlantic to be faced; it is probable that units of armies from this side will be carried back slowly so that the situation in America never will become acute.

In England the work is in the hands of Doctor Addison, the new minister of reconstruction, while coöperating closely with him is the French Bureau of Reconstruction, headed by Clemenceau. As far as is possible, the two countries are working together, as the problem is much the same in both.

First and foremost, these countries are considering the case of the scores of thousands of workers in munition factories. Over nine-tenths of these will be released during the next 18 months. In France, war contracts are being rearranged, curtailed, and amended so that some establishments will close each fortnight. The change is to be as gradual as possible, and each set of workers is notified a month in advance to enable them to make whatever provisions they desire in regard to new employment that may be most congenial or fitting for them.

In England, where more men and women in proportion to population are employed in this field than anywhere else in the world, a board has been appointed to care for the placing of the released employes in the civil branches of industry. While it is not expected that all the women now working making shells can be given jobs anywhere near as lucrative, the ideal held up before this new board is the placing of every patriotic worker in an advantageous position. All the peacetime mechanical industries have been urged to increase production to care for the growing labor supply, and it is possible even that government subsidy will be granted certain manufacturing industries which have thrown every resource into munition making. It will be all-important that these get back to the manufacture of looms, farm machinery, automobiles, tractors, presses, and the like, just as quickly as they got into shell making in 1914 and 1915.

But what about the soldiers themselves? The munition workers, of course, were patriotic and deserve consideration, but how much more deserving are the men who went out to give their lives, if need be! The present article will not consider the case of wounded or crippled men, as theirs is a problem entirely separate. Vocational retraining has to be given them, partial-wage agreements with employers have to be reached for them, and many safeguards and privileges provided that are not necessary for the ordinary workman-soldier.

France is planning to divide the units to be demobilized in several groupings. For the sake of clearness, let us suppose for a moment that the demobilization unit will be a division, approximately 12,000 men.

Of these there will be about 3,000 who will want nothing from the government except honorable-discharge papers. That is, they will be professional men, actors, storekeepers whose wives or families have kept up the business more or less well during their absence, independent farmers, sons of wealthy families who had no occupation before the war and expect none after hostilities are ended, and men for whose services there is a never-failing demand. These will be mustered out as quickly as the necessary formalities of equipment, check, and physical examination are ended.

Second, there is a large class of men, probably 4,000 in number, impoverished by the war. These are cobblers, storekeepers who sacrificed their shops when the call to the colors came, farmers whose dependents have had to use up their little property in order to eke out a living, and other men from similar occupations. Suddenly cast adrift, these men might be able to make some sort of bargain with the world, but it is almost a certainty that the vast majority would be unable to attain the same standard of life which they left.

The government owes them a certain amount of equipment. France herself cannot afford to lose these useful members of her communities, or even to have them drop hopelessly in the scale during the difficult period of readjustment and reconstruction. What France plans to do with these men simply is this: supply each man with the tools of the trade, the tiny store, the small farm, or whatever it was that he used in making a living. Wherever it is possible, the same shop, store, farm, or what not, is to be restored, together with an amount of capital sufficient to meet immediate expenses. In most cases, so thrifty and businesslike are these bourgeois, that at a cost to the government of only six or seven hundred francs they feel themselves wholly rehabilitated. Considering the fact that France will have several hundred thousand men in this class, it is plain that the bill for reconstruction will be huge. It will be worth while, however. The strength of France is in her solid, thrifty, honest bourgeois class.

Third and last is a class comprising roughly 5,000 men. Here are the clerks, the skilled mechanics, the plumbers' helpers, the salesmen, the vineyard hands, the taxi drivers, and all sorts and kinds from various types of employment. Before the war, these men worked for wages. After the war, most of them will do the same. If they are released in one great body, they will act upon the labor supply and the wage scale just as the released printers might have acted in the New York City instance. Not only will many of them be forced to work at low wages, but hundreds and thousands will not find the sort of employment to which they are best adapted. Many will find no employment at all for months. Starvation and want will ensue, and France has had burden enough in this war without loading herself with a nonproductive element of enforced beggars. This says nothing of the rights of the men themselves.

This is the way France is going to provide for them. From Pyrénées-Orientales to Pas de Calais, from Finistère to Haute Saône, are 34 French provinces. Each has its several departments. Each province is to have its director of employment. Below him in each department is to be a subdirector with his staff. The business of these officials is to be the cataloguing of the needs of commerce, industry, and the trades in respect to men. Also they have the task, acting as agents of the government, of urging forward production in all centers, so that a greater number of men can be absorbed.

These 5,000 men of the division will be catalogued according to the jobs they desire. Then they will be split into 34 sections, corresponding to the sections from which they come or to which they wish to go at the end of their military service.

Suppose, then, that a call comes from Gascogne for 620 clerks, stenographers, and bookkeepers.

The 406 (from our hypothetical division) from this province who had signified their desire of accepting these positions would be sent on immediately. The 214 vacant jobs thereupon would be offered to men wishing similar places who otherwise would have to wait the call from their provinces. Many single men with an adventurous spirit would accept, thus getting back into civil life weeks ahead of the time, perhaps, for which they were scheduled. Also the labor demand would be equalized all over the nation.

The same scheme is to be followed in respect to all forms of employment. Where men have experience in more than one line, or have no experience whatever, considerable latitude will be allowed them in their choice. The main point is that all will be taken care of; every French soldier who wants it will have his job waiting for him at the time he secures his discharge from the army. This means that France is going to merge gradually from being the most warlike of nations to being the same peaceful, prosperous, and thrifty country she was before the Germans broke through Belgium.

England's ground plan of demobilization is similar, though it does not go so deeply into the job-getting feature. With the English, however, the same thoroughness that characterized the retaking of Kemmel Hill—of which it is said that five "full dress" rehearsals were given behind the lines before the actual attack—creeps into the details of demobilization. England already has actually rehearsed the processes of returning her troops to their homes, and knows positively that everything will run smoothly.

At a time when the United States was not even thinking seriously of the end of the conflict—Sept. 20, 1918—the War Office, in conjunction with the Labor and Reconstruction ministries, "demobilized" a Cornwall (English), a Radnor (Welsh), and an Aberdeen (Scottish) regiment just for practice!

Of the men who took part in the mummery, one-half had "come direct from France," while the other half was supposed to have been transported from camps in England. Those who were tagged "from the train—hungry" were fed, and housing accommodations were provided at the dispersal stations.

The men, naturally, were in full equipment. First they were assembled in parade formation, and were inspected generally by the king and queen. Next they were marched to the Q. M. store, where a sand bag was doled out to each. In this he put all his private belongings, and the bags were officially inspected.

Then he turned in his rifle, and those who had "come from France" added their steel helmets and gas masks. Whatever was missing had to be accounted for then and there. If the missing article was important, as a rifle, for instance, the platoon officer was called in to corroborate the soldier's story. In case this corroboration was lacking, or unsatisfactory, the man's dispersal certificate was debited with an amount to correspond.

The men left the Q. M. store with only their uniforms, overcoats, greatcoats, and sand bags. Each man was told that he might keep his uniform and light overcoat, but that his greatcoat must be returned at the conclusion of his furlough. He was told also that for 28 days he would be allowed to wear the uniform day and night if he wished. After that time it was permissible for him to don it only on special occasions.

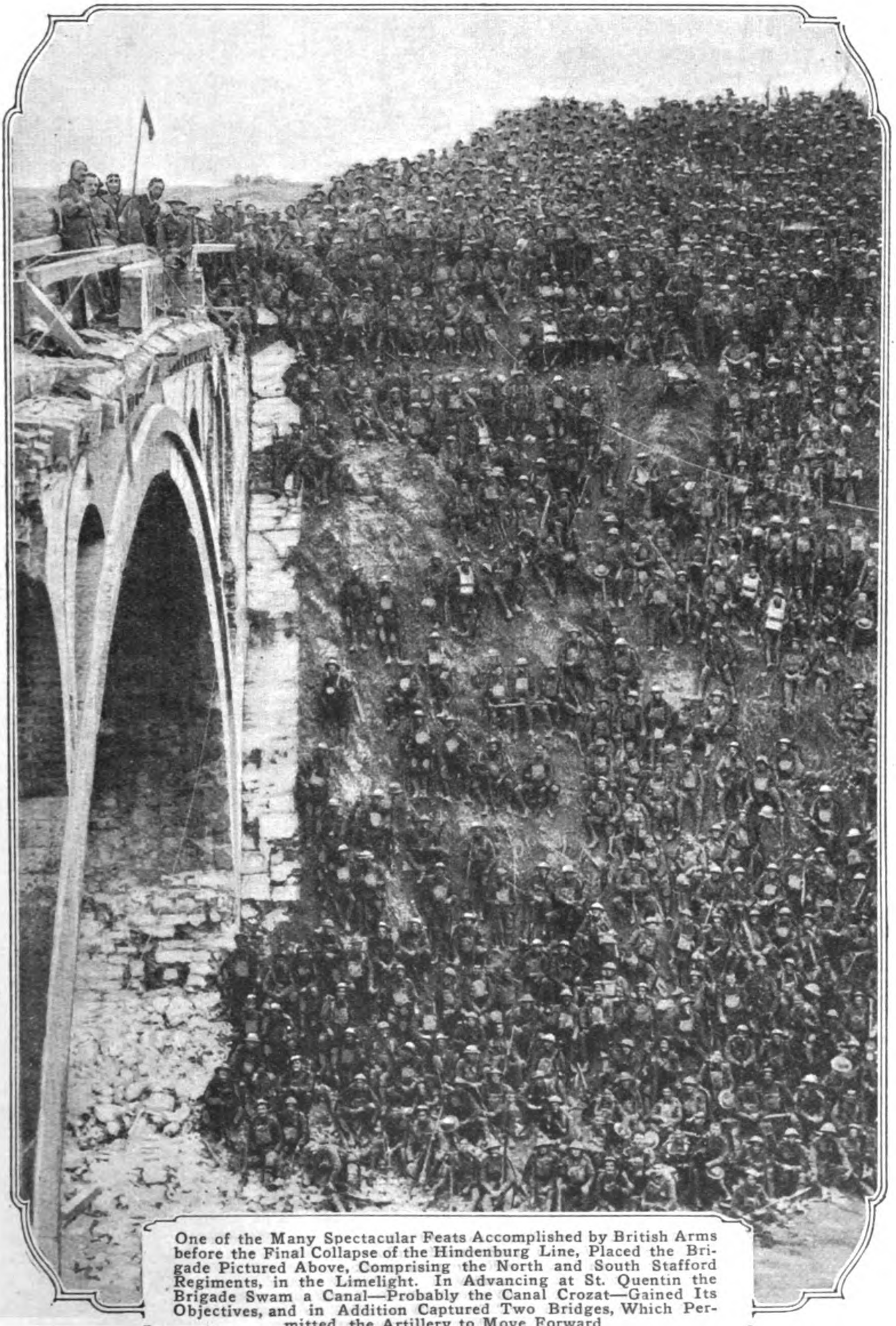
Then each soldier was "documented"—as the English have it. He passed through a number of fearfully thorough offices. Here he obtained his out-of-work certificate which is in reality an insurance policy, granting him an income each week for four weeks. In addition to this, he received in exchange for his dispersal certificate another paper, called a protection certificate, which he took with him on his "four-week furlough." This entitled him to a sum in advance immediately, the remainder of his deferred pay, and whatever additional bonuses the government might vote him. These sums were made payable at any English, Scottish, or Welsh post office on presentation of the certificate.

He received a label for the return of his greatcoat at the conclusion of his furlough, papers giving a description of his military service, and a railway warrant for his return journey, together with his employment-agency certificate to be used on reaching his home community. The railway warrant was put in a plainly marked envelope, which told him exactly where and when to catch his train home, in order to be in company of comrades going the same way.

There the "demobilization" ended. Except for the business of job getting, the machinery for which had not been organized fully at that time, the man was a civilian again. The moment each of the men in the three regiments reported to the station master at each of the railway depots, he was told to report again to his regiment. Then, presumably, he went back to the western front.

Now it is all over. The plans of France and England soon will be in full working order. May everything go off as smoothly in actual practice as it did in the dummy demobilization!

BRITISH BRIGADE SWIMS CANAL UNDER FIRE



One of the Many Spectacular Feats Accomplished by British Arms before the Final Collapse of the Hindenburg Line, Placed the Brigade Pictured Above, Comprising the North and South Stafford Regiments, in the Limelight. In Advancing at St. Quentin the Brigade Swam a Canal—Probably the Canal Crozat—Gained Its Objectives, and in Addition Captured Two Bridges, Which Permitted the Artillery to Move Forward

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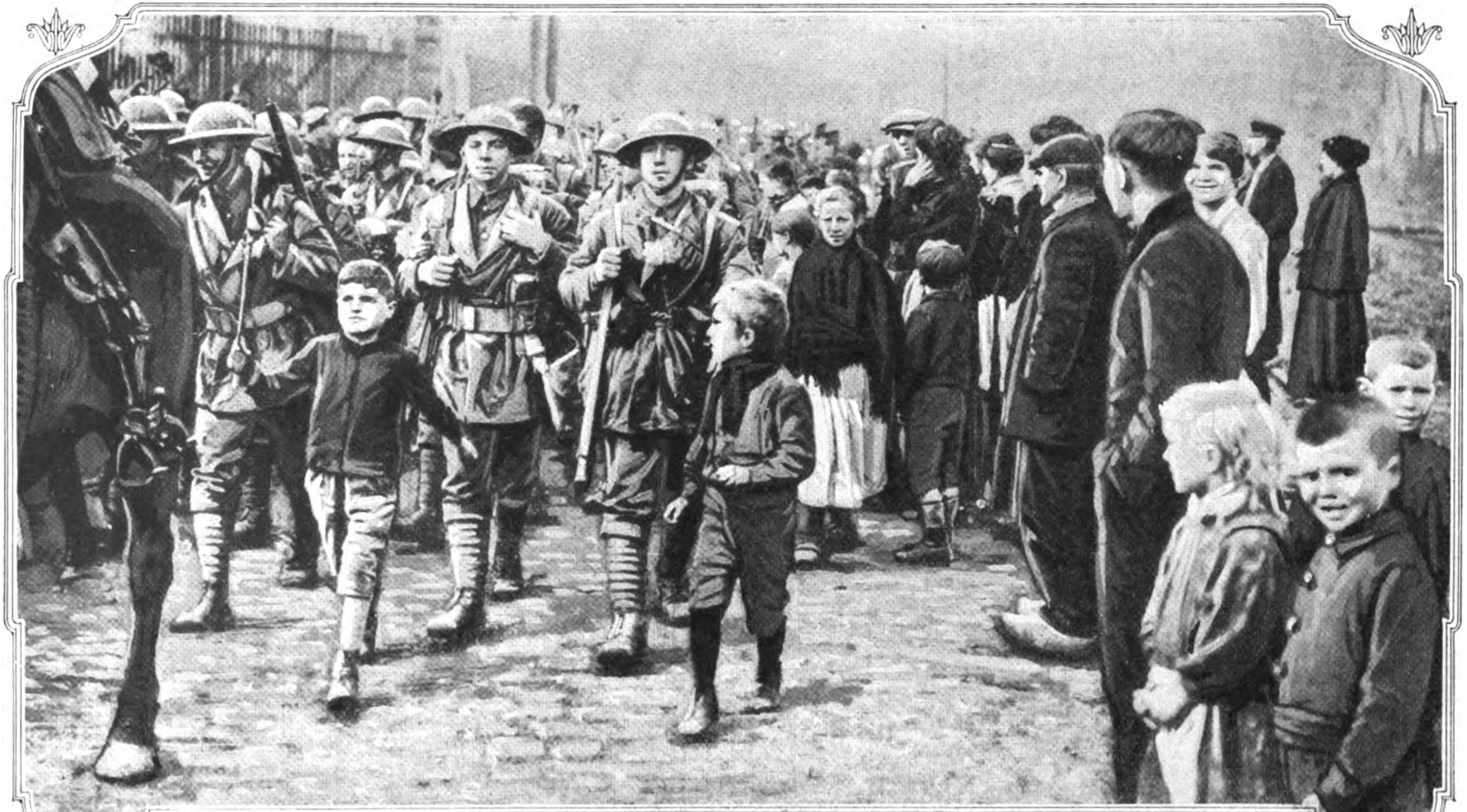

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TRIUMPHANT ENTRY OF BRITISH TROOPS INTO LILLE, LONG UNDER HUN'S HEEL

The Inhabitants of Lille Went Mad with Joy When the Tide of War Swept the Hun to the East and Brought British Troopers into the City Close on His Heels. For Four Years the Citizens had Suffered Humilities That Only the Hun can Inflict. The Picture Gives an Example of How the Roads Leading to the City, and the Streets in It, were Lined with Liberated Inhabitants Who Welcomed "les Anglais"

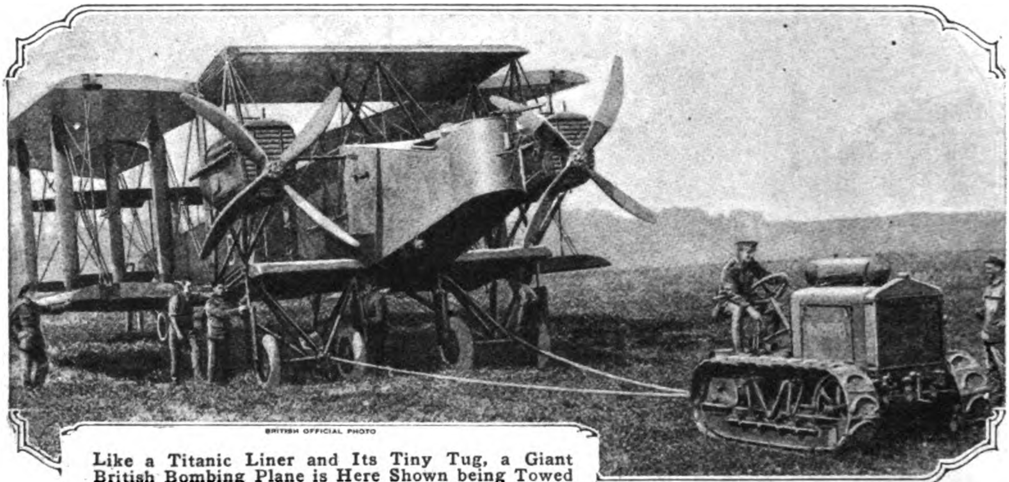
SOME VILLAGES WHIPPED HUN MUST REBUILD

It Is Easier to Destroy Than to Build, So the Task That Now Faces the Hun Is No Inconsiderable One. Villages without Number have been Demolished, Even as the One Pictured Above, and These the Vanquished Foe must Restore

This Photograph, Taken Shortly before the Cessation of Hostilities, Shows a Procession of French Tanks Wending through the Ruins of a Reconquered Village in Pursuit of the Retreating Hun. The Destruction Is Not So Complete Here, for at This Time the Allies Were Too Close upon Them

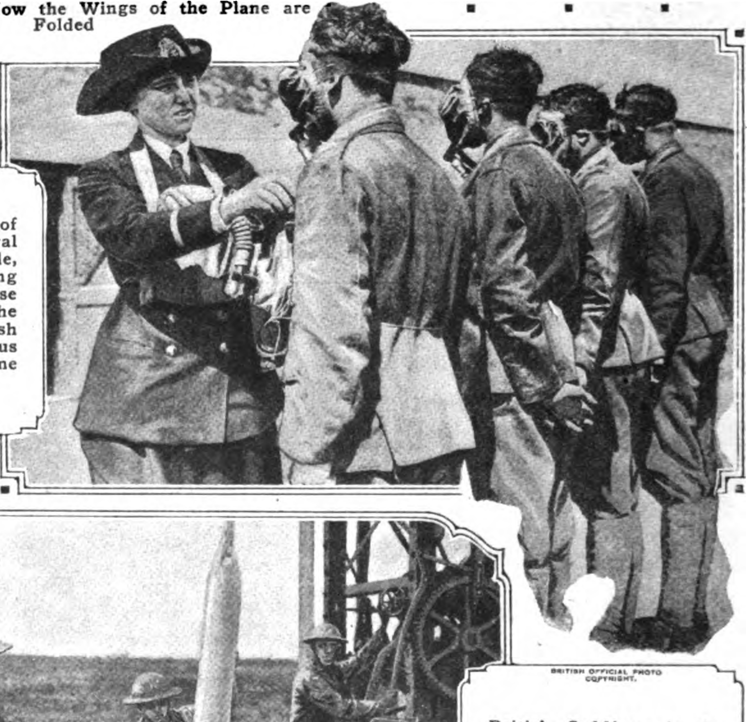
PHOTOS FROM FRENCH PICTORIAL SERVICE

WITH FRENCH, BRITISH, AND AMERICANS



BRITISH OFFICIAL PHOTO

Like a Titanic Liner and Its Tiny Tug, a Giant British Bombing Plane is Here Shown being Towed to Its Hangar by a Diminutive but Powerful Field Tractor. Note How the Wings of the Plane are Folded



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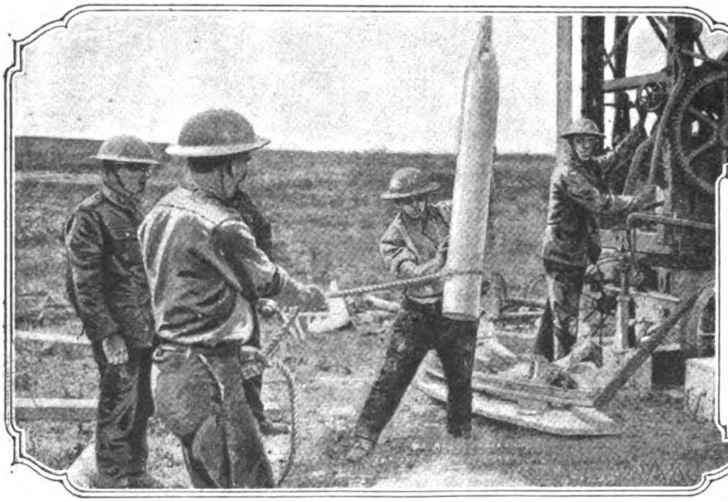
The Volunteer Member of the Women's Royal Naval Service Pictured at the Side, Is Engaged in Instructing British Rookies in the Use of Gas Masks. From the Outset of the War, British Women Took Conspicuous Parts in Activities at Home and Abroad



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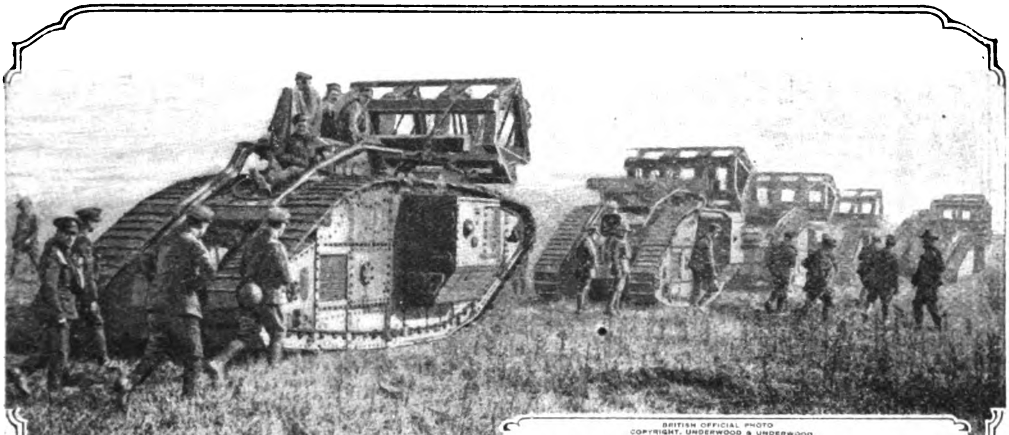
British Soldiers in the Region of the Somme Drilling for Water: The Cylindrical Device Shown in Use Is a "Bailer" Employed for Removing the Creamy Chalk Sludge from the Bore. The Photograph was Taken While the Cylinder was being Emptied

DURING LAST DAYS OF THE GREAT WAR



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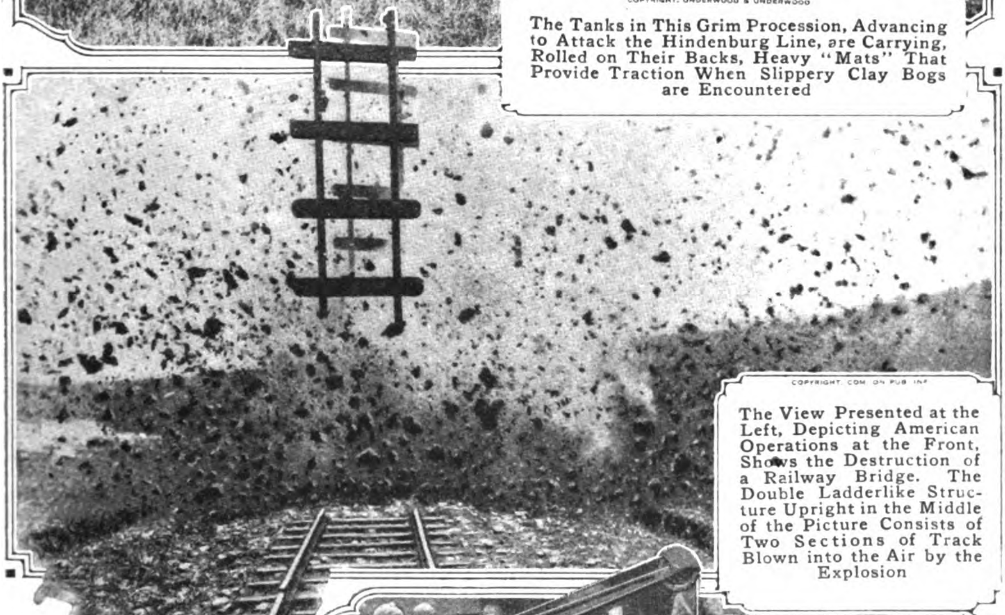
The Tanks in This Grim Procession, Advancing to Attack the Hindenburg Line, are Carrying, Rolled on Their Backs, Heavy "Mats" That Provide Traction When Slippery Clay Bogs are Encountered



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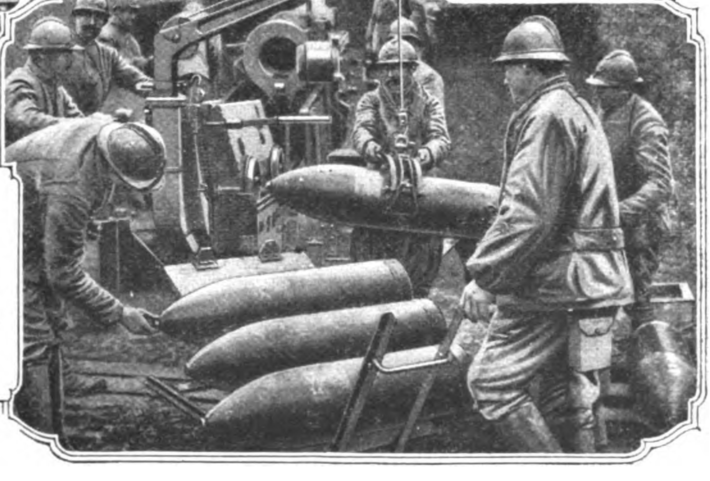
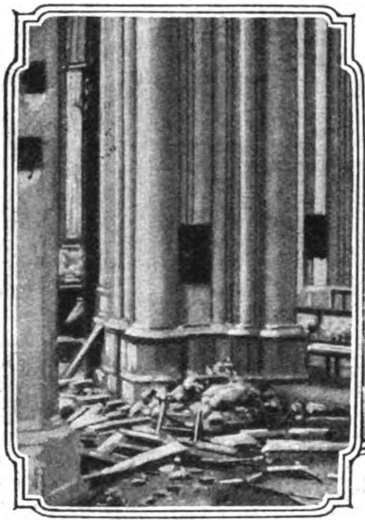
The View Presented at the Left, Depicting American Operations at the Front, Shows the Destruction of a Railway Bridge. The Double Ladderlike Structure Upright in the Middle of the Picture Consists of Two Sections of Track Blown into the Air by the Explosion



FRENCH OFFICIAL PHOTO

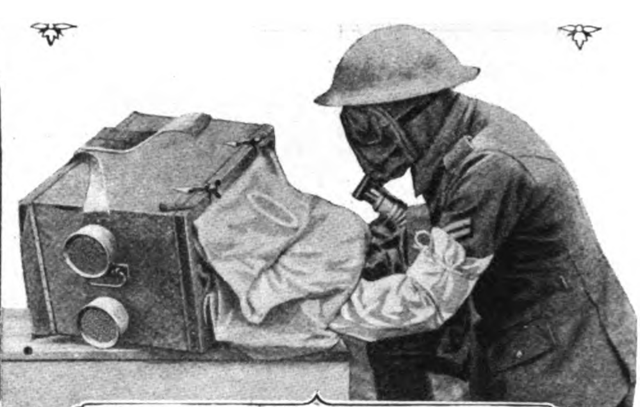
Close Glimpse of a French Artillery Battery in Action Shelling Hun Positions in Alsace: The Projectiles, It will be Observed, are Passed from a Truck to the Gun by a Small Crane, Thus Eliminating the Necessity of Handling the Heavy Shells Manually

MEMENTOS OF WAR "MADE IN GERMANY"



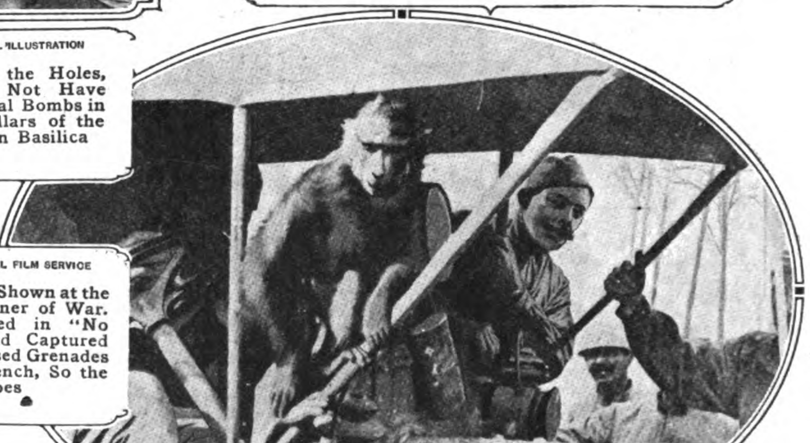
BY COURTESY OF L'ILLUSTRATION

After Cutting the Holes, the Hun did Not Have Time to Conceal Bombs in the Hollow Pillars of the Saint Quentin Basilica



BRITISH OFFICIAL PHOTO

Gas-Proof Portable Pigeon Loft Captured from the Enemy during the Last Days of Hostilities: Tommy is Shown Demonstrating How Messages were Attached to the Birds When the Air was Poisoned



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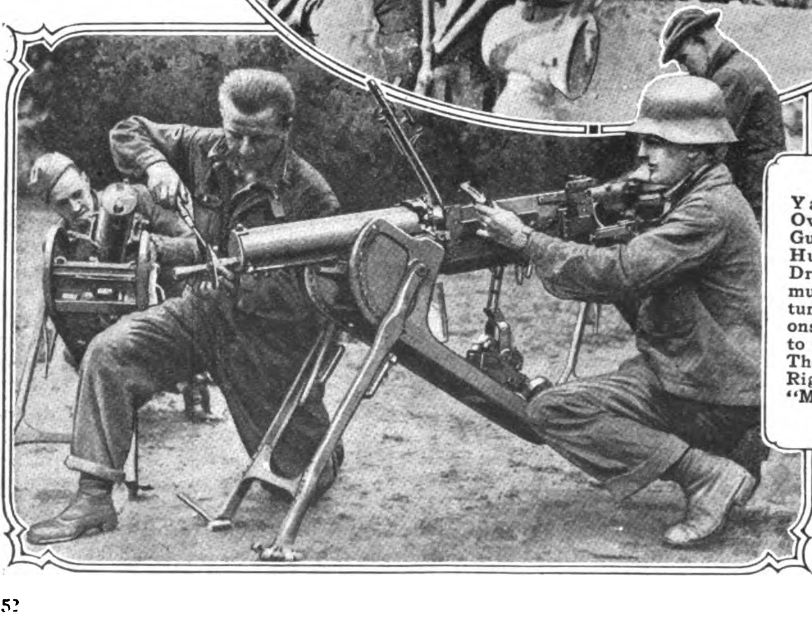
"Jock, the Hun," Shown at the Right, Is a Prisoner of War. He was Wounded in "No Man's Land" and Captured After He had Tossed Grenades into a French Trench, So the Story Goes



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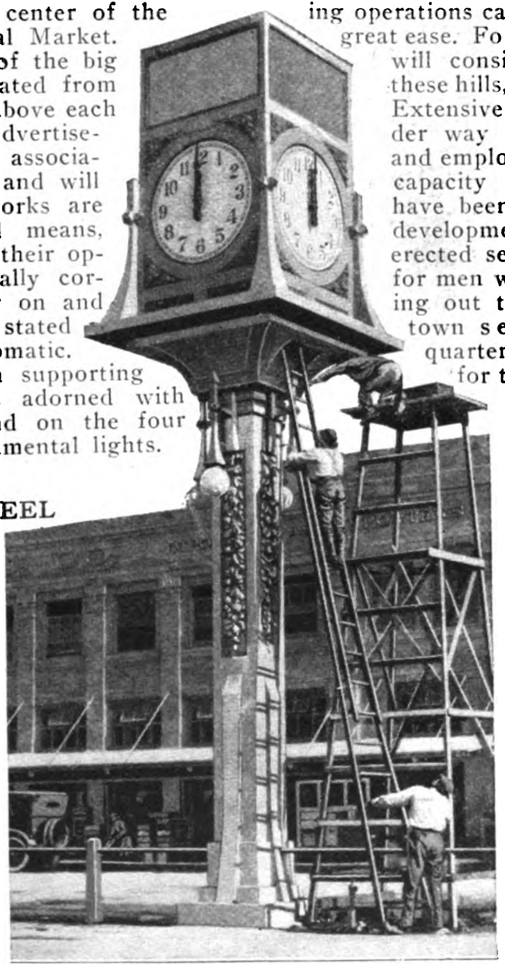
Yankee Mechanics Overhauling Machine Guns Taken from the Hun in the Final Drive: Enough Ammunition was Captured with the Weapons to Enable Them to be Put in Service. The Soldier at the Right Wears a Helmet "Made in Germany"

LARGE PEDESTAL TIMEPIECE ORNAMENTS MARKET PLACE

A handsome pedestal clock, 35 ft. high, constructed of reinforced concrete, has been erected in the center of the Los Angeles Terminal Market. The four 6-ft. dials of the big timepiece are illuminated from within at night, and above each is a panel containing advertisement space for the association which provided and will maintain it. The works are wound by electrical means, and any variation in their operation is automatically corrected. The turning on and off of the lights at stated hours is also automatic.

The single column supporting the clock proper is adorned with sculptured fruits, and on the four sides of it hang ornamental lights.



A 35-Foot Pedestal Clock of Distinctive Design Which has been Erected in the Center of the Los Angeles Terminal Market

BUILD GREAT STEEL PLANT IN MANCHURIA

A big industrial project, indicative of the awakening in the Orient in which the Japanese are taking a leading part, is a steel mill which is being built in Manchuria by the South Manchuria Railway. The undertaking has been hindered to a degree by the great rise in price of materials, but nevertheless two smelting furnaces, having an annual output of 150,000 tons of pig iron, are being constructed. In the extensive regions from which the iron ore is to be procured, whole hills, it is said, are made up of the raw material and the mining operations can be carried on with great ease. For some time the work will consist of digging away these hills, beginning at the top. Extensive preparations are under way for housing officials and employes. Quarters with a capacity for 250 single men have been constructed, and a development company has erected several hundred houses for men with families. In laying out the site for the new town separate residential quarters have been provided for the Japanese and Chinese.

¶Officers of the North West Mounted Police report the discovery of several fairly large lakes and a number of rivers in northern Canada during a circuit patrol journey lasting nearly a year. Their route extended from Baker Lake, at the head of Chesterfield Inlet of Hudson Bay, northwest to Kent Peninsula and return via Gordon Bay and Aberdeen Lake. Lake Perry, named for a commissioner of the force, is the largest of the lakes found.

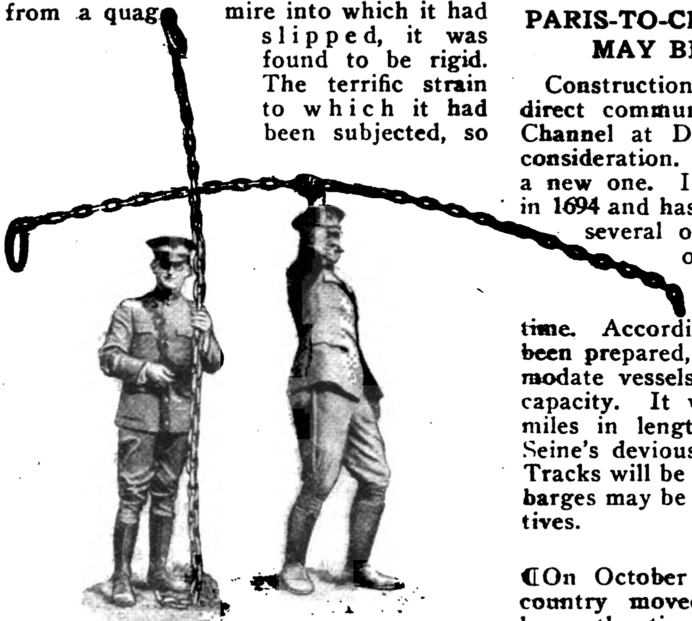
ACETONE MADE FROM CARBIDE AND PACIFIC KELP

As one result of the war, two interesting sources of acetone and acetic acid have been brought to attention. A Canadian firm was requested by the British government to experiment with calcium carbide as a raw material for the production of acetone. Within a short time a process was developed that ended in the plant manufacturing more acetic acid, it is said, than any other firm in the world. The method, briefly, consists in the production of acetylene from calcium carbide, and acetaldehyde from acetylene. Then by oxidizing the aldehyde, acetic acid is provided.

On the other hand, a large powder company established a plant near San Diego for the extraction of acetone and potash from kelp. The establishment is the largest of its kind ever developed. It covers 30 acres of ground and employs 1,000 men. In 1917 about 24,000 tons of kelp were harvested monthly.

HEAVY CHAIN IS MADE RIGID BY TERRIFIC STRAIN

After a heavy chain had been used as a tow line, in pulling a large artillery tractor from a quagmire into which it had slipped, it was found to be rigid. The terrific strain to which it had been subjected, so stretched it that its links gripped each other firmly and gave it the character of a linked bar. When placed on end, it was able to support itself. Gripped at the middle and held overhead, it bent only slightly.

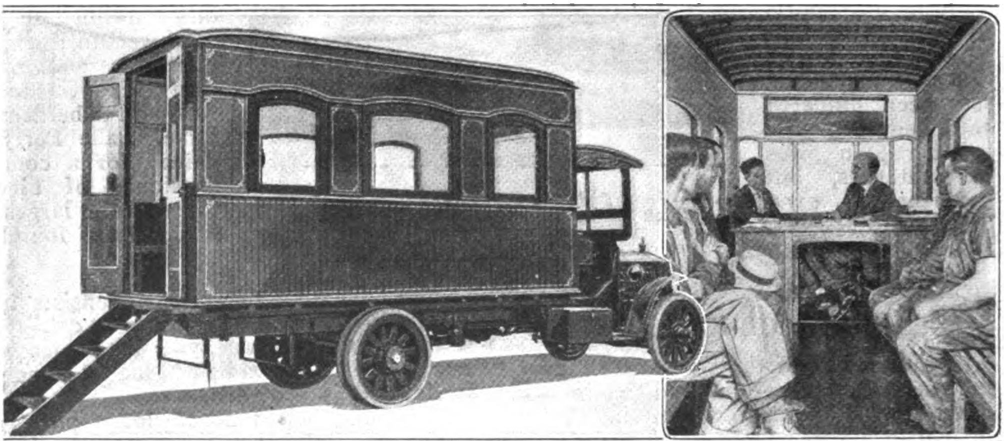


Two Views Which Clearly Show the Rigidity of the Chain After It had been Used in Pulling an Artillery Tractor Out of the Mud

PARIS-TO-CHANNEL WATERWAY MAY BE CONSTRUCTED

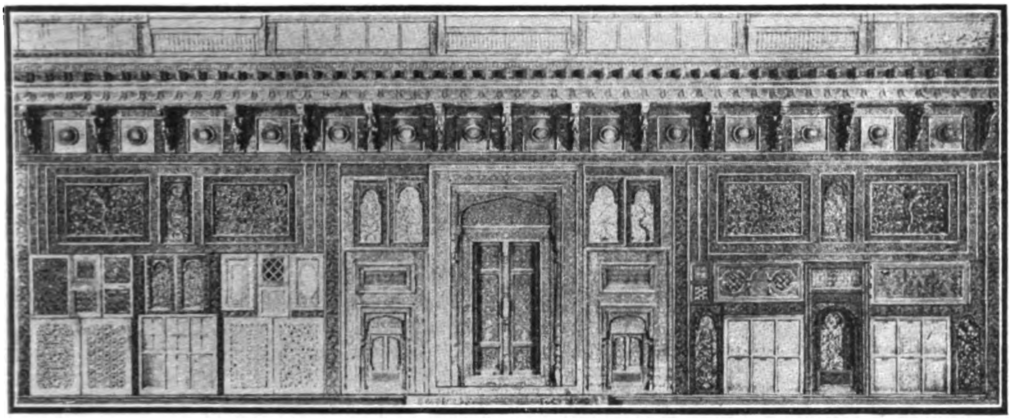
Construction of a canal to give Paris direct communication with the English Channel at Dieppe is receiving serious consideration. The plan is by no means a new one. It was originally suggested in 1694 and has since been reproposed on several occasions. The congestion of traffic on the Seine makes the project one of considerable importance at this time. According to the plans that have been prepared, the waterway will accommodate vessels of about 1,400-ton cargo capacity. It will be approximately 102 miles in length, as compared with the Seine's devious route of some 219 miles. Tracks will be laid parallel with it so that barges may be towed by electric locomiotives.

¶On October 27 when the rest of the country moved the clocks ahead one hour, the timepieces in Detroit, Mich., with the exception of those in the post office and railway stations, were not changed. Instead it was announced that on that day the city would adopt eastern time in place of central time.



MOTOR TRUCK IS EQUIPPED AS EMPLOYMENT OFFICE

As one means of obtaining a sufficient number of workers in spite of the scarcity of men, a large automobile-manufacturing concern has equipped a large truck as a branch employment office. This car frequents the districts where workmen are to be found and enables them to learn all about prospective jobs, and to hire out if they desire, without journeying to the plant. It is entered by a removable set of steps installed at the rear and is furnished with a regular office desk, chair, and benches for eight. Pipes supplied with water heated by the engine keep the interior at a comfortable temperature in winter.



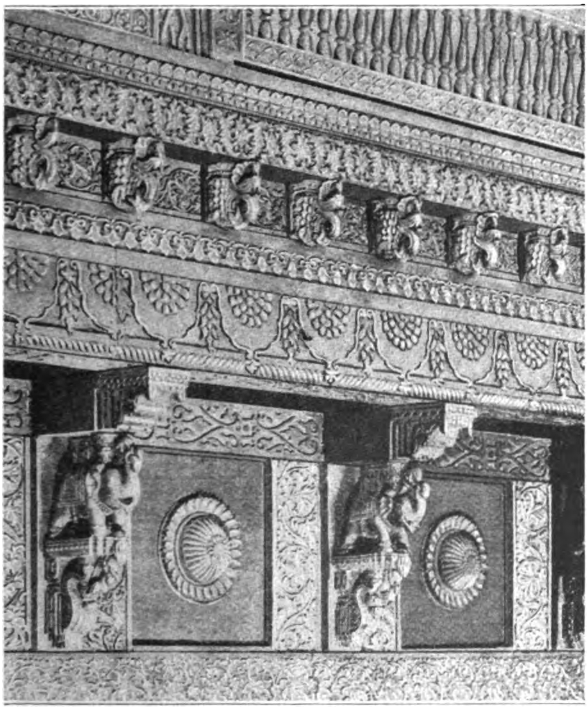
PHOTOS BY COURTESY OF THE JOHN HERRON ART INSTITUTE, INDIANAPOLIS

General View of a Magnificent Screen Recently Acquired by the John Herron Art Institute at Indianapolis: The Panels, Cornice, Door, and Windows Composing This Collection Are Specimens of the Finest Carving of India. Not a Little of It is Done by Young Children Whose Training Begins before Their Teens

SCREEN SHOWS AMAZING SKILL OF INDIA'S CARVERS

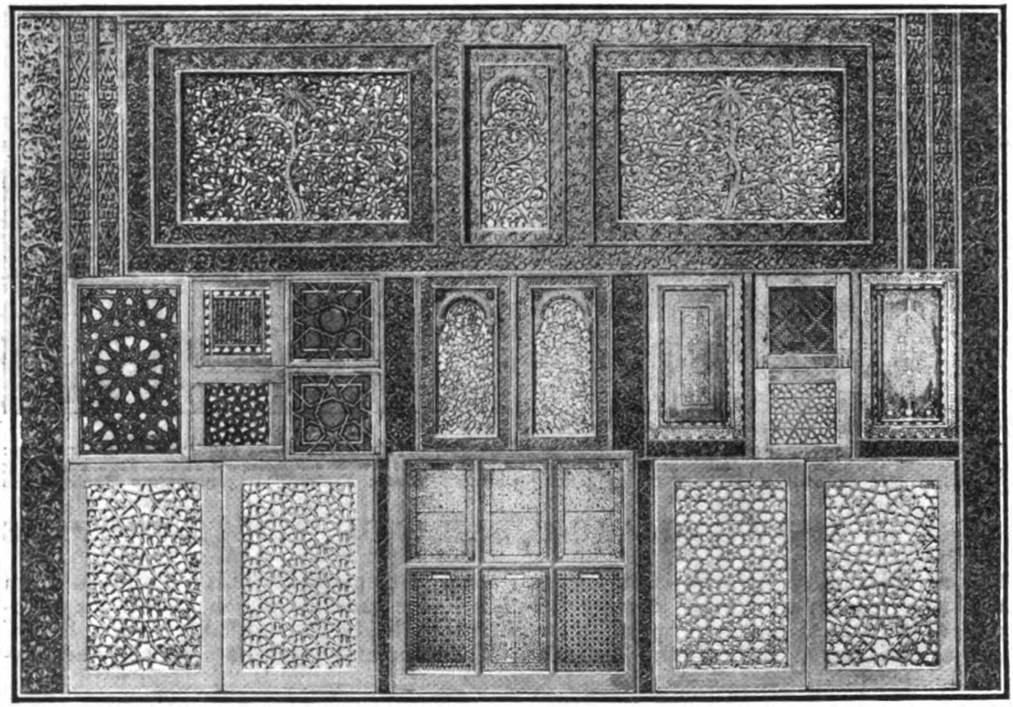
A magnificent screen, consisting of several hundred square feet of carving typical of the finest work in wood, metal, stone, and ivory, to be found in India, has recently become the property of the John Herron Art Institute at Indianapolis, after having been on exhibit there for some time. The various panels, of which many are originals and others copies made by native workmen, are wonderful evidence of skill which occidental craftsmen have not attempted to equal.

In the center of the screen is a large door with windows on either side, brought from Adoki Province, India. Extending the full length of the display, near the top, is a delicately adorned cornice supported by carved elephants. This was taken from a house in India which was in the process of being dismantled. To the left of the door and windows are two panels inlaid with ivory, which at first glance have the appearance of being openwork carving. At intervals along the bottom, in frames containing six panels each, are exquisite examples of pierced-brass work.



Detail of the Cornice, Which is Supported by Carved Figures of Elephants: This Costly Piece of Ornamentation was Secured from a House in India That was being Dismantled

The carvers begin learning their trade when as young as three years old, and when from eight to twelve years old are often as skilled as adults. The most elaborate designs are wrought without any patterns other than rough sketches. The woodworkers sit on the ground and hold the wood with their feet. This enables

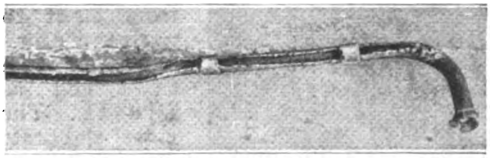


A Close View of a Portion of the Screen, Which Gives Some Idea of the Extraordinary Delicacy of the Designs: The Six Small Panels in the Center of the Bottom Row Are of Pierced Brass. Most of the Others Are of Wood

them to use both hands and often both feet in guiding their tools, and to put their whole weight on them where needed. The bringing of every muscle into play results in a cleanness and directness in cutting impossible in bench work.

EXTENSIVE RUPTURE CAUSED BY HIGH INDUCED VOLTAGE

Extensive damage was done recently when a 500-volt elevator circuit was "shorted" because a 100-ampere switch was opened while under heavy load. The high voltage induced entirely destroyed the switch, its metal cabinet, and the cutouts, and ruptured six feet of conduit, shown in the accompanying illustration, and insulation on 140 ft. of wire.



The High Voltage Induced by the "Shorting" of a 500-Volt Elevator Circuit, When a Switch was Opened under Load, Ruptured Six Feet of Conduit as Shown Herewith

LARGE DRY DOCK AT QUEBEC NEARLY READY FOR USE

Quebec's new dry dock, which is one of the largest in the world, is practically complete. It has been under construction for the past four years. The structure is situated on the south bank of the St. Lawrence River and has a length of 1,150 ft. and a breadth of 120 ft. It is divided into two compartments, the inner of which is 650 ft. long. A floating caisson closes the interior entrance, while a rolling caisson has been provided for the outer one. Although four hours may be required for filling the dock, its pumping equipment, designed to deliver 6,300 gal. a minute, is expected to empty it in about two and a half hours.

¶The soldiers who remain on duty in France and Belgium this winter should have no difficulty in keeping warm, for the forestry section of the American forces has promised to have ready for delivery 1,000,000 cubic meters of firewood. This is sufficient to make a woodpile 1 yd. wide and 1 yd. high extending from Paris to Berlin.

WOODEN SHIP COMPLETED IN RECORD TIME

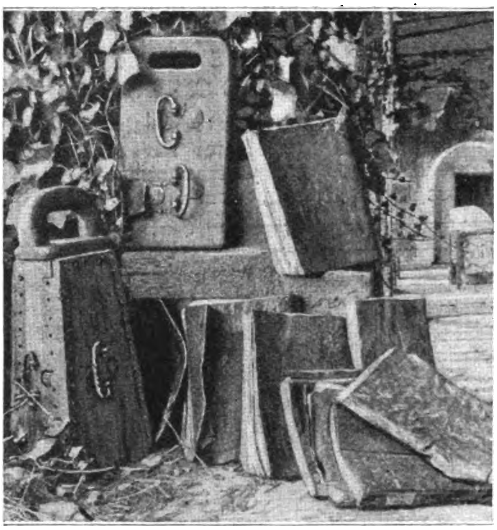
By completing a wooden ship of 4,000 tons, dead weight, from keel to water in 17½ working days, in a shipyard in Aberdeen, Wash., the builders claim that a world's record has been established for both wooden and steel ships of this type and tonnage. The concern has its own sawmill in the yard, so that considerable time is saved by cutting the timbers on the premises. More than 2,000 men have been employed in three shifts in the yard, and for a time, in response to an appeal for more help, over 100 local business and professional men went to work at shipbuilding after business hours.

INDIAN LOG RIDERS BECOME REAL ACROBATS

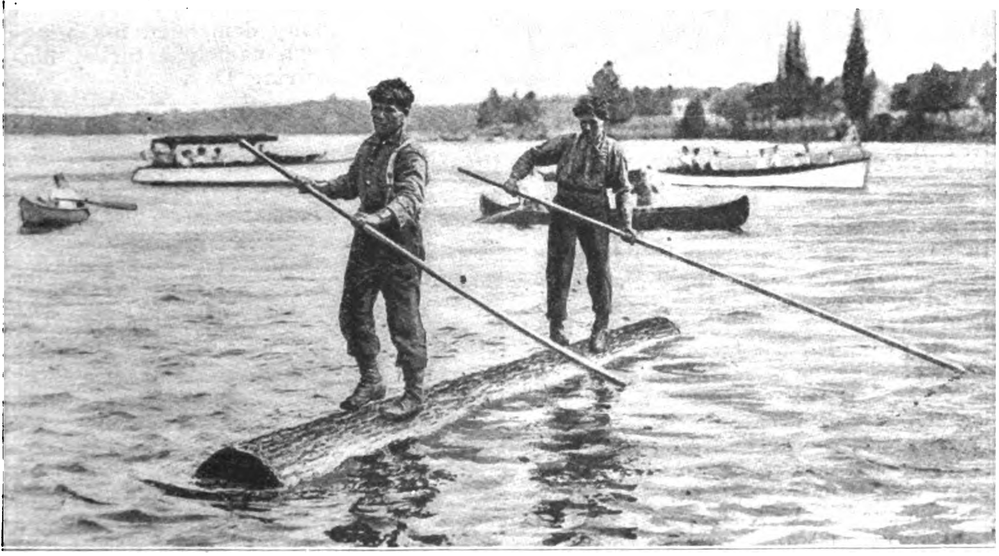
To one unfamiliar with life in logging regions the skill of the lumbermen who handle logs in the water is truly astonishing. Something of the dexterity required of them is indicated by the accompanying photograph of two Indian river men standing upright on a log and paddling their way across a wide expanse of water. It must be borne in mind that the slightest impulse will spin a "craft" of this sort at high speed, and extraordinary agility is needed if the riders are to keep out of the water.

PRECIOUS OLD VELLUM BOOKS IN CALIFORNIA MISSION

Many travelers to the Pacific coast are surprised to find in that region, commonly considered "new," several Franciscan monasteries dating back to prerevolutionary days, and preserving with the greatest fidelity the atmosphere of medieval times. Within their walls are vine-



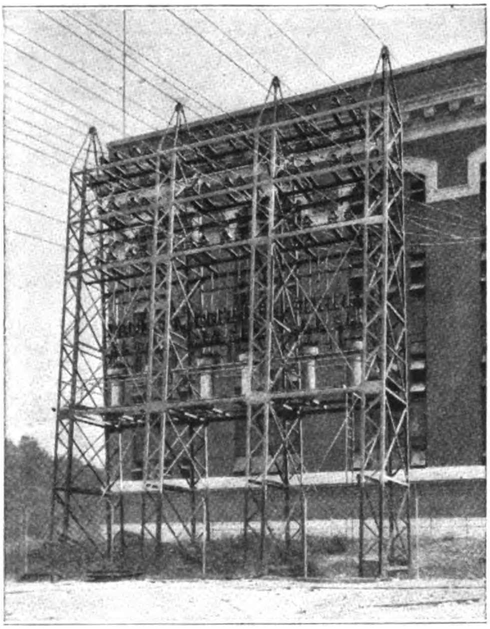
Priceless Records of the Early Years of the California Missions, and the Old Iron-Bound Case in Which They are Kept: This Picture was Taken at San Juan Capistrano Mission



A Balancing Act Which Rivals the Feats of Circus Performers: These Indian Logging Men are Paddling Their Way across a Wide Stream on a Log Which will Spin at High Speed the Instant Either of the Two Places His Weight Unevenly. Spikes in the Shoes Give the Men Sure Footing

covered cloisters, secluded walks, and musty libraries containing manuscripts of time-yellowed vellum. Some of the most interesting of the latter are shown herewith, being the early history of the California missions. They were written by the hand of the mission's founder.

ANCHOR TOWERS CARRY SIX THREE-PHASE CIRCUITS



Anchor Tower at One End of an 850-Foot Span of Transmission Lines Extending across ;the Miami River at Dayton, Ohio: The Structure Carries Six Three-Phase Circuits of 6,600 Volts

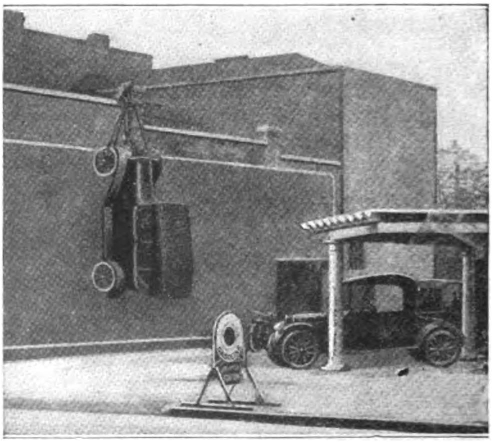
Two anchor towers recently erected either side of the Miami River at Dayton, Ohio, to carry transmission lines across, that stream, combine a number of features of interest alike to the amateur and the expert electrician. The span which the towers support is 850 ft. long. The structures carry six three-phase circuits of 6,600 volts, and above them, attached to the tops of the steel frames, are four grounded conductors of copperclad wire. The wires of each three-phase circuit are strung one above the other, and each circuit is protected by choke coils, and electrolytic lightning arresters. The latter are said to be the first three-phase arresters of this outdoor type which have been produced. A steel stairway and a substantial platform are provided for the safety and convenience of the man charging the arresters.

AEROPLANES SWARM LIKE BEES OVER CALIFORNIA CITY

During the fourth Liberty-loan campaign Los Angeles witnessed one of the most spectacular aerial demonstrations so far enacted in America. A remarkable fleet of 115 military aeroplanes soared above the city, dropping Liberty-bond "literature" and executing graceful evolutions high above the central section of the city. The craft approached from the flying field at Riverside at an elevation of about 5,000 feet and suddenly bore down on the city like a swarm of bees, the droning of their unmuffled motors roaring like the surf on a rocky coast. Only one of the planes had to make a forced landing. At an altitude of about 3,700 feet above the business district, it developed engine trouble. It glided easily to a suburban district and landed safely in an open field. It is interesting to note that in flying approximately 94 miles, the 115 machines consumed 3,000 gal. of gasoline.

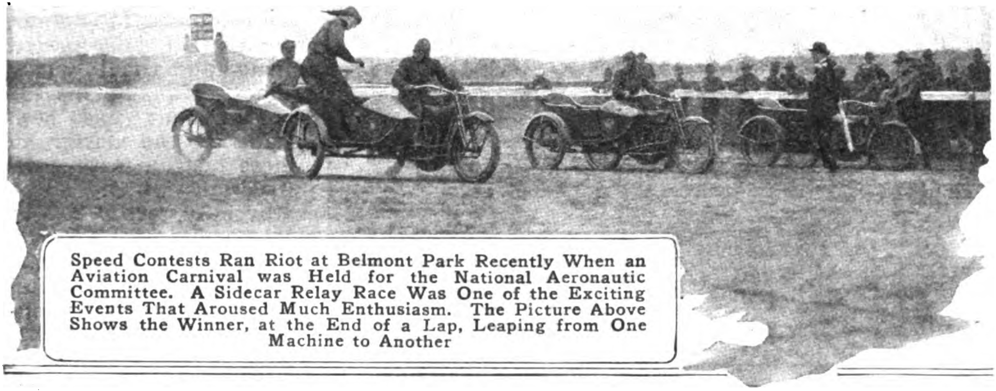
CAR LITERALLY "FIXED UP" ON SIDE OF BUILDING

Workmen for an auto-sales concern who are on good terms with their employer, recently took literally the latter's instruction regarding his car, to the effect that they should "fix it up," and hung the automobile well up on the outside of the building. In view of the fact that it was a Halloween prank, the owner took the joke good-naturedly and agreed to pay the penalty demanded for bringing the car down, namely a turkey dinner on Thanksgiving Day.

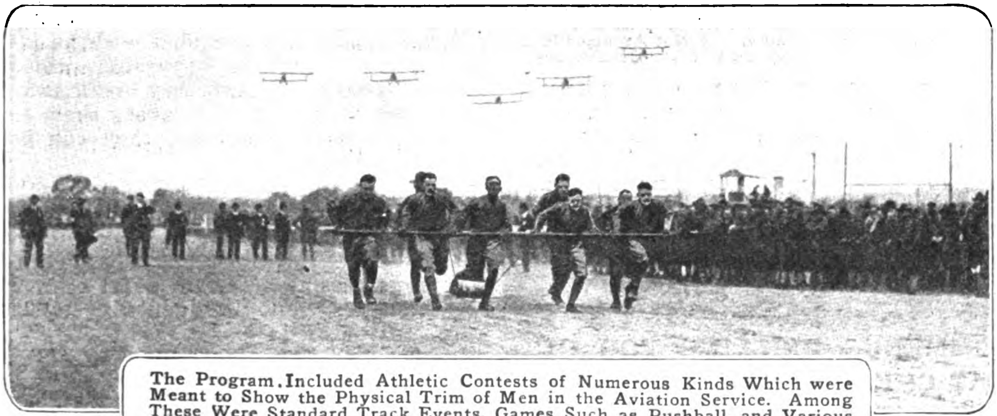


The Position in Which an Automobile Dealer Found His Own Car After He had Instructed His Employes to "Fix It Up" for Him: The Order was Given Just before Halloween

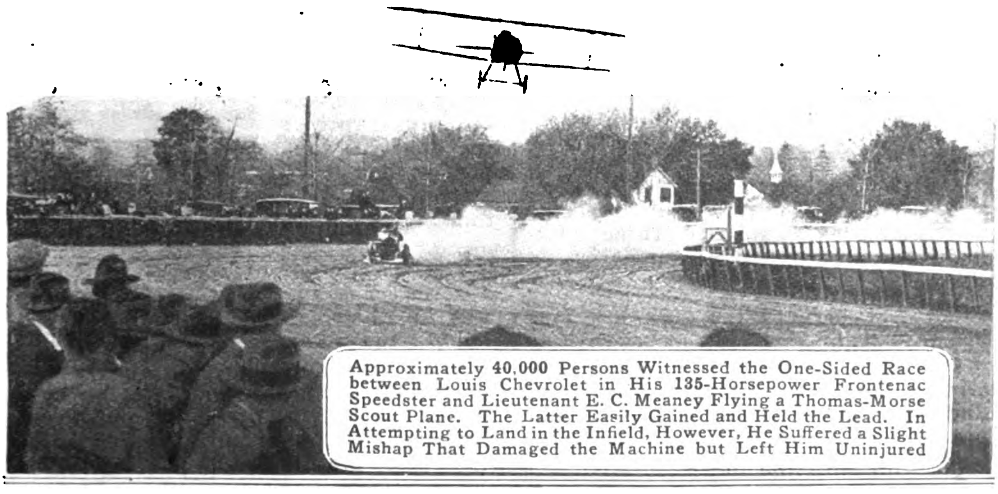
THOUSANDS SEE AIRMEN FROLIC ON LONG ISLAND



Speed Contests Ran Riot at Belmont Park Recently When an Aviation Carnival was Held for the National Aeronautic Committee. A Sidecar Relay Race Was One of the Exciting Events That Aroused Much Enthusiasm. The Picture Above Shows the Winner, at the End of a Lap, Leaping from One Machine to Another



The Program, Included Athletic Contests of Numerous Kinds Which were Meant to Show the Physical Trim of Men in the Aviation Service. Among These Were Standard Track Events, Games Such as Pushball, and Various Exhibition Contests Like the Novel "Chariot" Race Pictured Above and Participated In by Teams of 10 Men Each

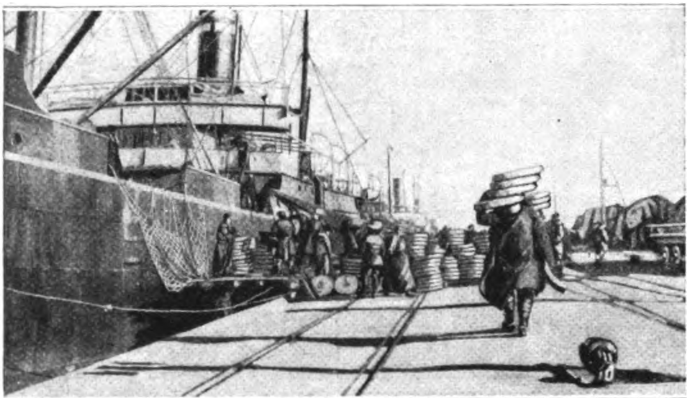


Approximately 40,000 Persons Witnessed the One-Sided Race between Louis Chevrolet in His 135-Horsepower Frontenac Speedster and Lieutenant E. C. Meaney Flying a Thomas-Morse Scout Plane. The Latter Easily Gained and Held the Lead. In Attempting to Land in the Infield, However, He Suffered a Slight Mishap That Damaged the Machine but Left Him Uninjured

PHOTOS BY EDWIN LEVICK

MANCHURIAN SOY-BEAN CAKE SHIPPED TO EUROPE

With the production of many commodities far below normal in Europe, the allies in some cases have gone to the corners of the earth to replenish their stores. The demand for soy-bean cake is a case in point. Soy beans are a principal product of Manchuria, and in recent months tons of the big round cakes made from these beans have been shipped from that remote land to Europe, for use as stock feed.



The Objects Piled on the Wharf in This Port of Darien, Manchuria, Formerly the Russian Dalny, Are Not Automobile Tires, as One Might Suppose, but Soy-Bean Cakes

COMMENCE DRILLING FOR OIL AT CHESTERFIELD, ENGLAND

It may be surprising to many persons to learn that the first organized attempt to establish oil wells in the United Kingdom was launched only three weeks before the cessation of hostilities. In mid-October drilling was begun on the estate of Lord Hartington near the village of Hardstoft, six miles from Chesterfield. Other operations were expected to be started early in November in the same locality. It was reported that 40 American drillers with machinery were ready to begin work at seven different sites selected near Chesterfield, and that three additional locations were being sought.

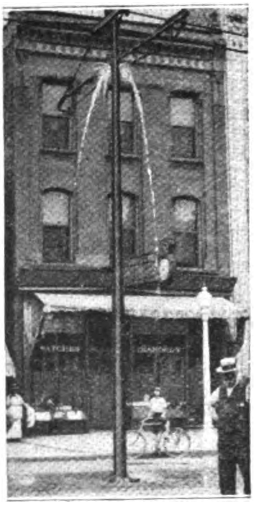
¶ What was perhaps the strangest task for which steam shovels ever were used was the digging of graves in certain cemeteries in the East for victims of Spanish influenza, who were so numerous that there were not enough shovelers available to make the graves.

ACCIDENT-PROOF MINES MADE IN LARGE QUANTITIES

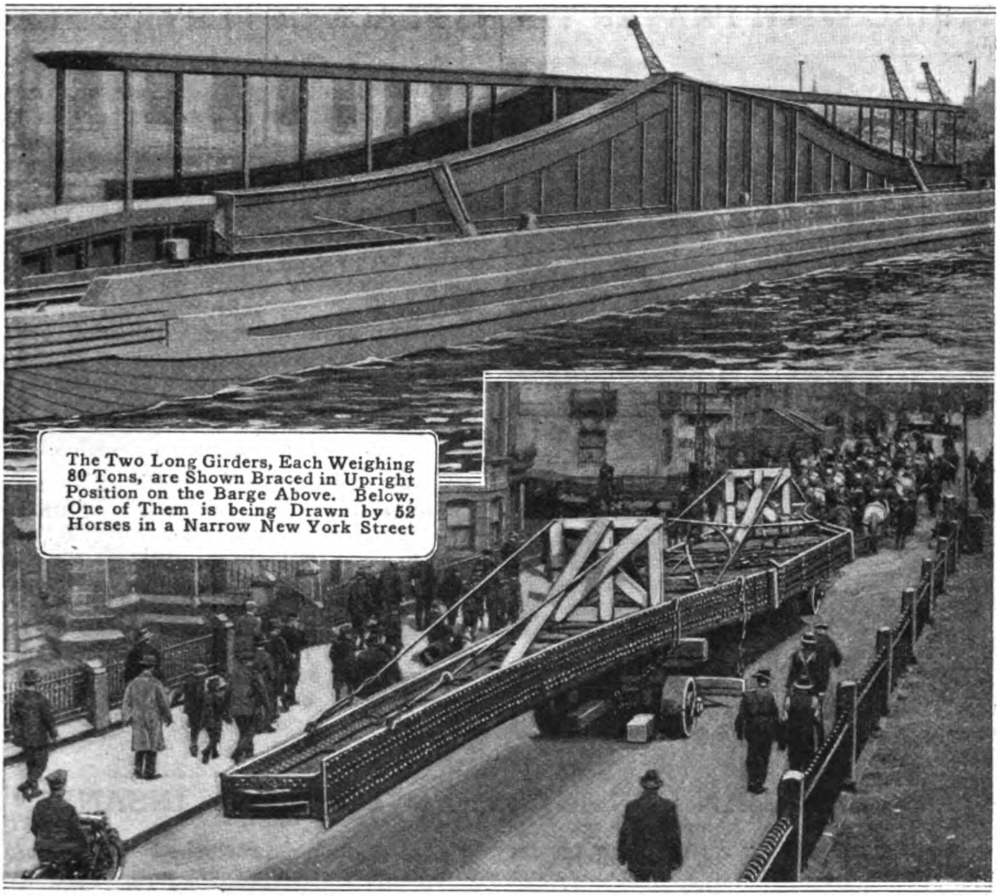
Wonderful progress in the production of mines has been made by the Navy Bureau of Ordnance since the beginning of the war, the present daily output being approximately 1,000 mines. Equally marked improvement has been made in the design of these instruments of destruction which have proven a terror to the submarines. They are regarded as among the safest mines in the world to handle, as is demonstrated by the fact that there has not been an accident in transporting or placing them. They are provided with an internal apparatus which renders them harmless, if they break away from their moorings, and causes them to rise to the surface so that they can be easily disposed of.

TROLLEY POST BECOMES A REAL FOUNTAIN

Persons passing a certain point on one of Chicago's much-frequented streets were astonished recently to see two streams of water issuing from near the top of an iron pole which supported a trolley wire. Apparently a water main beneath the hollow pole had burst and the water from it rose in the upright support until it overflowed near the top.



¶ The eclipse of a few weeks ago was in all probability the first event of the sort which has been observed from an aeroplane. At that time a flight and an observation—the latter not strictly scientific of course—were made at Port Sill, Okla.



The Two Long Girders, Each Weighing 80 Tons, are Shown Braced in Upright Position on the Barge Above. Below, One of Them is being Drawn by 52 Horses in a Narrow New York Street

PHOTOS BY EDWIN LEVICK

LONG, HEAVY PLATE GIRDERS HAULED IN GOTHAM STREETS

Two 80-ton plate girders, each 136 ft. in length, were recently hauled through the streets of New York to the site of a viaduct, now under construction, which, when completed, will carry Park Avenue across Forty-Second Street. The massive structural members were removed from a barge and separately loaded on heavy trucks. They were moved, one at a time, to the building site by 52 horses under the control of 28 drivers.

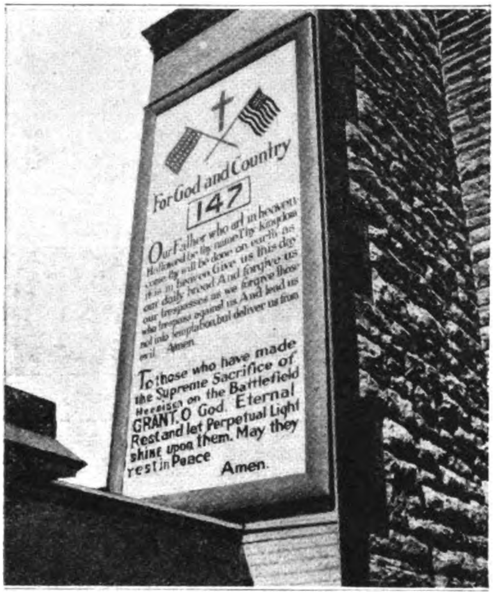
CARVING MODELS OF BIRDS IS SAILOR'S HOBBY

The hobby of a widely traveled sailor who has now given up life on the sea is the making of realistic wooden models of birds which he has seen in various parts of the world. He has a collection of over 200 models, each painted in colors so lifelike that at a short distance they cannot be distinguished from real birds.

A Retired Sailor and a Few of His 200 Hand-Carved Models of Birds Which He has Seen in Various Parts of the World

The carver has also developed great skill in imitating the songs of these birds.

PANEL WITH PRAYER TAKES PLACE OF SERVICE FLAG



Glass-Covered Inscription on Church Wall Takes Place of Service Flag. The Figures Given Indicate the Number of Men in Uniform and are Painted on the Outside of the Glass So That They can be Changed Easily if Need Be

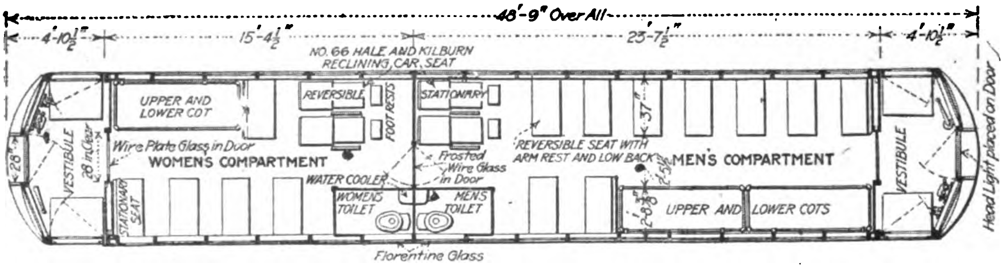
A large Cincinnati congregation, instead of displaying the conventional service flag in honor of its members in the service, has placed a tablet on an outer wall of the church. It consists of a prayer surmounted by crossed flags painted on canvas and inclosed in a frame. One of the flags is a national ensign and the other is covered with stars. The whole is protected by heavy plate glass. Instead of adding more painted stars as occasion required, the total number of men in the service is painted on the outside of the glass and can be easily kept up to date. Space was left either side of the number for gold stars.

¶ While at an altitude of 4,800 ft. an aeroplane passenger at one of the southern aviation camps recently made a successful parachute jump. Just as the leap was about to be made, the pilot stalled the engine slightly and banked sharply to the right so as to throw the tail of the plane out of the way of the parachute. The success of the experiment may lead to a general equipment of military airplanes with parachutes.

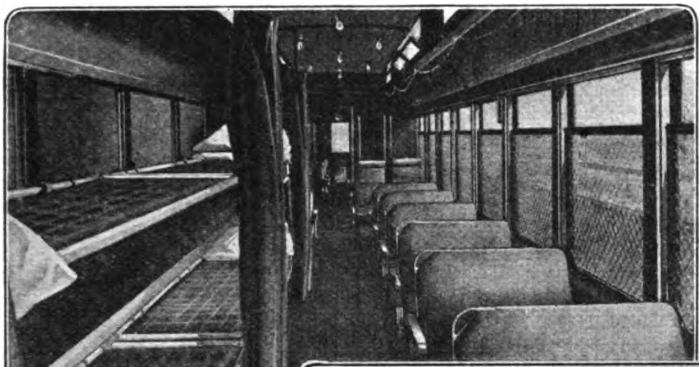
INTERURBAN CAR EQUIPPED TO CARRY INSANE

For the purpose of transferring insane patients from Cook County's psychopathic hospital, in Chicago, to various state institutions with the least inconvenience and publicity, the county authorities have had built an interurban car of special design which travels from the hospital yard direct to the asylums. Outwardly the car resembles those in service on Chicago's surface lines except that the windows are of wire-reinforced glass and are protected on the inside by heavy screens.

The interior is divided into two compartments, one for men and the other for women. Each is furnished with several ordinary reversible seats and upper and lower berths, of a folding type, for invalid patients. Cloth curtains can be drawn in front of the berths to give the occupants privacy. Toilet facilities are provided for each compartment. In the women's section two of the seats are of the reclining-chair type. The marker lights and an emergency light in each section automatically connect with storage batteries in case the trolley pole leaves the wire, so that the car is not plunged into darkness when connections are broken at night.

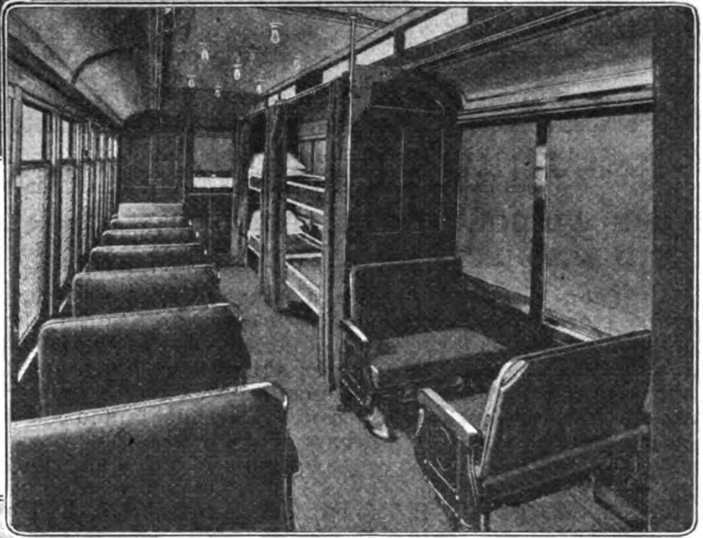


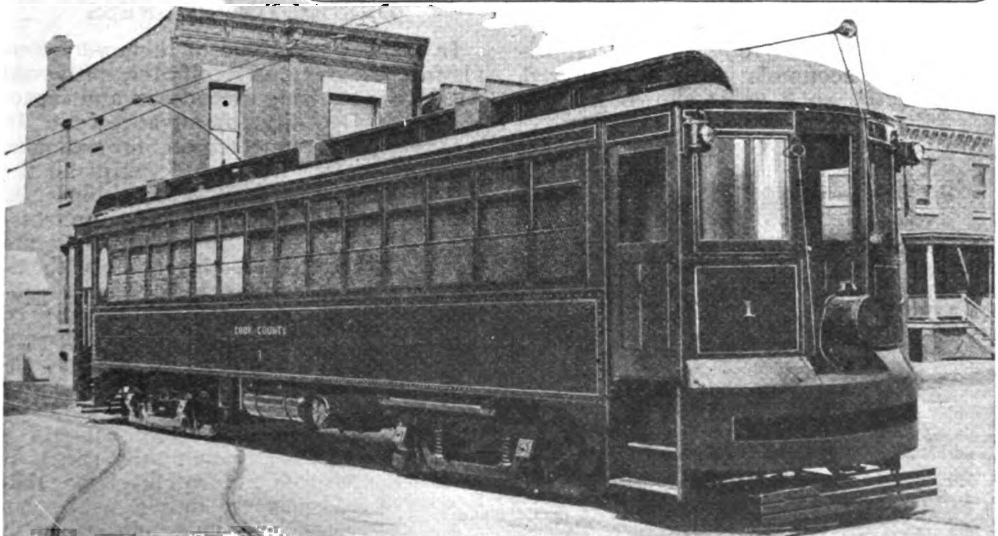
Floor Plan of Hospital Car for Use on Chicago Surface Lines and Connecting Interurban Lines, Showing the Relative Size of the Two Compartments and the Number and Arrangement of Seats and Berths



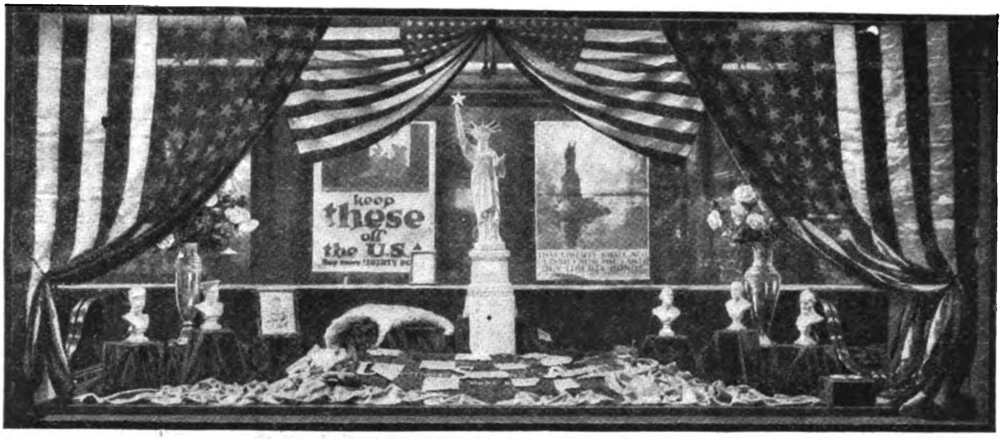
At the Left Is an Interior View of a Special Car Designed to Carry Patients from Chicago's Psychopathic Hospital Direct to Various State Institutions. In This Compartment, Which Is for Men, Are Leather-Covered Seats of the Reversible Type, on One Side, and on the Other Side are Two Lower and Two Upper Berths, Which can be Shut Off by Curtains

The View at the Right, as Well as Those Above and Below, Shows the Windows Protected on the Inside by Heavy Wire Guards to Prevent Violently Insane Patients from Breaking the Glass. In Addition to the Regular Electric Lights There Are Emergency Lights Which are Automatically Switched on to Batteries if the Regular Current Supply should Fail





While the Car Has the Appearance, Externally, of Other Chicago Cars, the Double Bumper Is a Special Feature. This Permits Coupling to Either a City or an Interurban Car, Which Have Bumpers at Different Height



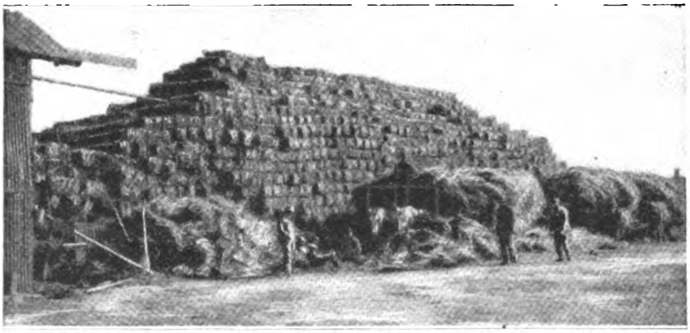
Patriotic Window Display in Jewelry Store, Depicting Nation's Spirit and Resources: In the Foreground Is a Map of the United States Made of Red, White, and Blue Velvet. The Statue of Liberty and the Cornucopia Overflowing with Grain Each Tells Its Own Story

STORE WINDOW SHOWS SPIRIT AND RESOURCES OF NATION

A window display in a large Chicago jewelry store recently expressed with exceptional artistic skill the spirit of America and its readiness to draw on its abundant resources in meeting the demands of war and the reconstruction period. The central feature was a large map of the United States, tufted red, white, and blue velvet being used to represent the various states. At the upper edge of the map, which was tilted toward the window, lay a large cornucopia overflowing with grains, while beside it rose a white miniature of the Statue of Liberty. On pedestals at either side were busts of famous presidents and military leaders of the present day. Silk flags were used as draperies.

MANY TONS OF HAY PILED IN THE OPEN

In these times of food and feed shortage, a large accumulation of unsheltered, baled alfalfa, such as is shown here, is unusual. The hay was in an irrigated section of Colorado and was in little danger of being damaged by rain. There are 600 tons, or more, in this pile, accumulated in a single week pending the arrival of freight cars for shipment.



A Pile of 600 Tons of Alfalfa Worth Many Thousands of Dollars: This Big Pyramid of Bales Is the Result of a Week's Haymaking in a Fertile Irrigated District in Colorado

NATIVE ALASKANS SHOW DESIRE TO PROGRESS

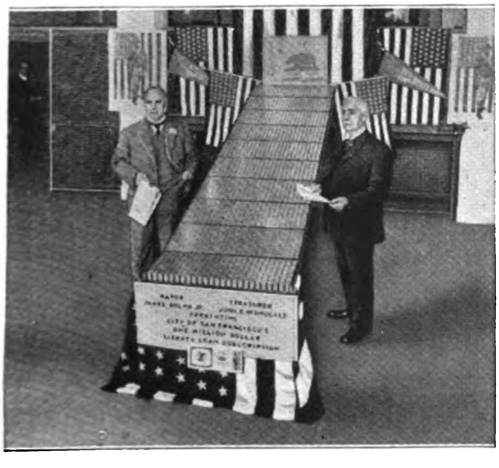
In many ways, some of them very simple in character but significant, natives of Alaska are showing their desire and capacity for advancement. In one region, for example, where practically all the traveling is done by water and an unnecessary number of dogs are kept, the natives themselves have been advocating the killing off of many of these animals because of the much-needed food that they consume. This indicates the development of a real community spirit. It is noteworthy, also, that every native who can read is a subscriber to one or more newspapers, which are read slowly and carefully. In many cases illiterate parents have their children read to them that they may keep informed of world events. They show special interest in items gathered from the school.

MAY MAKE RHONE NAVIGABLE FOR BENEFIT OF SWISS

French engineers have evolved a plan for making the Rhône River navigable from the Swiss border to Marseille. When peace comes the question will be raised as to what water route to the sea, other than the Rhine, can be offered the Alpine republic. Though by international agreement the Rhine is a free river, it has been closed to Switzerland since the beginning of the war. The opening up of the Rhône to navigation is the proposed means of relieving the Swiss of their present dependency on Germany. It is said that it will only be necessary to make 20 additional miles of the Rhône navigable, and that this can be accomplished for the most part by building a lock at a point which has been selected. This lock would make available an immense amount of hydroelectric power which would largely pay for the investment.

MILLION DOLLARS IN GOLD FOR LIBERTY BONDS

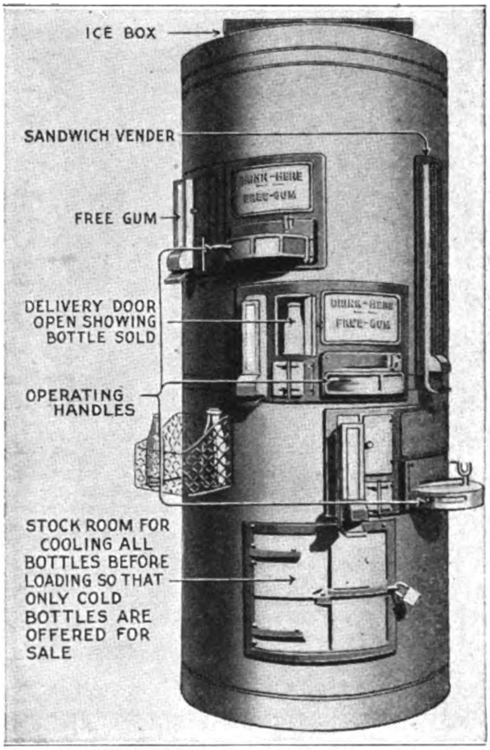
The popular phrase, "It looks like a million dollars," could be applied without exaggeration to a pile of gold coin which was recently exhibited in San Francisco. That municipality bought $1,000,000 worth of Liberty bonds and paid for them in gold specie. The exchange of the coin for the government certificates was made a formal affair and the money paid was arranged in neat piles on a long inclined table decorated with the Stars and Stripes, and with a number of pennants.



One Million Dollars in Gold Coin Paid by the City of San Francisco for Liberty Bonds

SOFT DRINKS AND SANDWICHES ARE SOLD BY MACHINE

One of the interesting developments in the vending-machine field is a large apparatus that dispenses bottled beverages, sandwiches, and chewing gum. The device operates much the same as smaller machines of similar purpose with which the public is familiar. Its cooling chamber has space for the accommodation of 96 bottles, while a precooling compartment, in which bottles are chilled by immersion in the water that drains from the ice, has an equal capacity. In order to encourage patrons to return empty bottles to the machine, a stick of gum is discharged when a bottle is placed in the receiver provided for it. A counterfeit detector rejects spurious coins. A complete record of all transactions is kept by a sales-registering mechanism. The only attention the machine requires is that involved in stocking and icing it daily.


ICE BOX
SANDWICH VENDER
DRINK-HERE FREE-GUM
FREE GUM
DELIVERY DOOR OPEN SHOWING BOTTLE SOLD
DRINK-HERE FREE-GUM
OPERATING HANDLES
STOCK ROOM FOR COOLING ALL BOTTLES BEFORE LOADING SO THAT ONLY COLD BOTTLES ARE OFFERED FOR SALE

The Big Vending Machine Dispenses Cold Bottled Beverages, Sandwiches, and Chewing Gum, Rejects Counterfeit Coins, and Keeps a Complete Record of All Transactions

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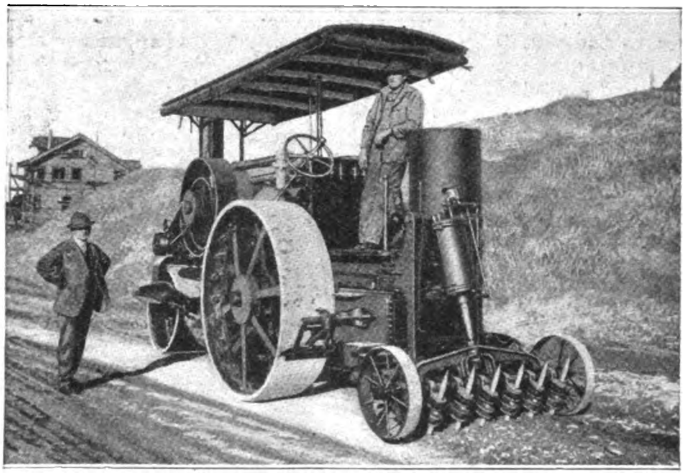
¶In Norway whales' intestines are being prepared for use in making gloves.

USE STEAM-ROLLER SCARIFIER ON CALIFORNIA ROADS

For road-repair work the street department of San Francisco makes use of a steam-operated scarifier that is attached at the rear of a steam roller. It breaks up the hard surface dirt so that a grader, that follows behind, can perform its function effectively.



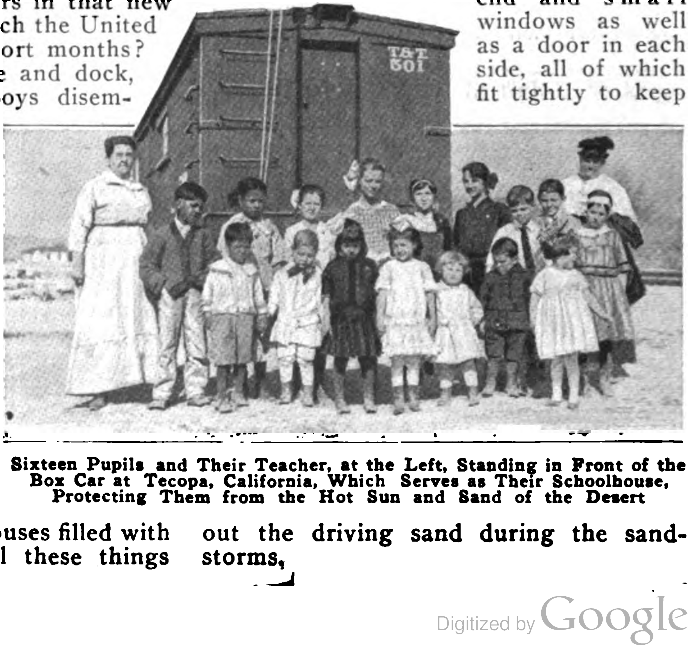
The Road Scarifier at Work, Preparing the Way for the Grader: It is Operated by the Cylinder Visible at the Rear, Which is Supplied with Steam from the Boiler

"AMERICA'S ANSWER," A WONDERFUL MOVING PICTURE

What would we all not give to be set down for a couple of hours in that new vast seaport of France which the United States created in a few short months? To see the convoys arrive and dock, with thousands of our boys disembarking, along the miles of wharves, and transfer to American cars drawn by huge American locomotives on the hundreds of miles of American-built railroads? Would you not enjoy a sight of how all manner of war machinery and supplies are transferred from ship to train, and watch the magic assembling of locomotives from parts made here; and the great machine shops, cold-storage and ice plants, and a city of warehouses filled with all kinds of supplies? All these things and hundreds more of the constructive achievements of our government, are to be seen in that remarkable U. S. official war picture, "America's Answer," issued by the Division of Films, Committee on Public Information. This is not a battle movie, though it shows how the boys live, and scores of interesting things connected with army life. Every person in this country should see "America's Answer." If your favorite movie theater has not yet had this film, ask the manager to secure it, and witness one of the biggest surprises you ever had.

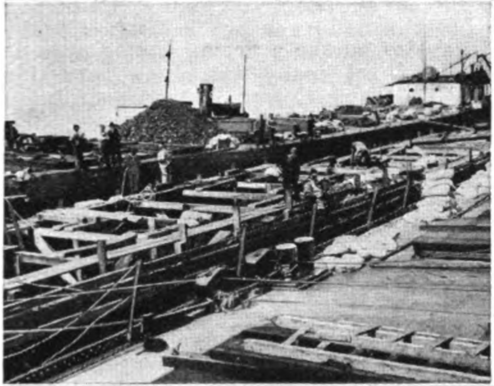
SCHOOL IN DEATH VALLEY HOUSED IN BOX CAR

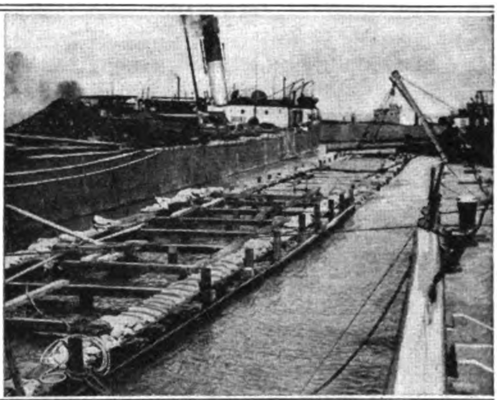
At Tecopa, Calif., in the heart of Death Valley, the schoolhouse where 16 children of the mining camp assemble daily is a box car. The housing facilities in this desert spot are so limited that there seems to be no other place where the children can gather. The woman teacher for these little folks, three of whom are Piute Indians, has divided the car into two rooms; one for her living quarters, and the other for the schoolroom. The car has a door at one end and small windows as well as a door in each side, all of which fit tightly to keep out the driving sand during the sandstorms.

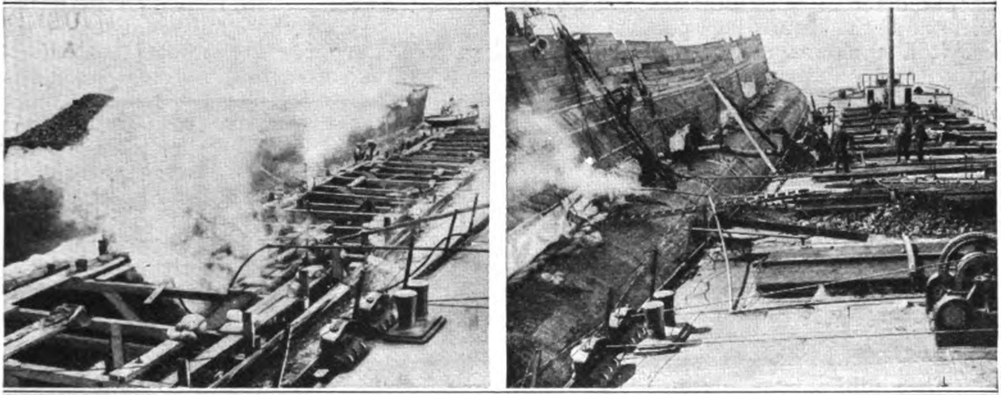


Sixteen Pupils and Their Teacher, at the Left, Standing in Front of the Box Car at Tecopa, California, Which Serves as Their Schoolhouse, Protecting Them from the Hot Sun and Sand of the Desert

USE BIG COFFERDAM TO RAISE FOUNDERED STEAMER


The Long Cofferdam in Position over the Sunken Hull of the "Henry Cort," Ready to be Submerged and Screwed in Place by Divers


Showing the Cofferdam Fast to the Foundered Whaleback and Protected against the Waves by Vessels Stationed at the Sides and Ends


The Picture Above, at the Left, was Taken When the Final Pumping Operations were Begun. The Other Photograph Shows the Whaleback Freighter at the Surface, the Cofferdam Still in Place

Several weeks ago, before the close of navigation, salvagers succeeded in raising the sunken whaleback freighter, "Henry Cort," from the bottom of Lake Erie, where it had spent nearly a year. Late in the season of 1917, while battling in the ice floes, the ship collided with another steamer and sank near the west shore of the lake. In the spring, after some difficulty, it was sighted in 30 ft. of water about six miles from its original location, whence it had been carried by the ice during the winter months. The hull was imbedded in the mud so that the deck was from 12 to 16 ft. beneath the lake's surface. Because the ship was well out in the open lake, the difficulties of raising it were multiplied. The first attempt was a complete failure, for the deck collapsed under the strain of pumping. A cofferdam, 240 ft. long, was then made fast to the hull by divers, but was almost immediately wrecked during a storm. A similar accident occurred subsequently. Late last September, however, a final and successful effort was made. The cofferdam was reinforced and protected from the sea by barges placed alongside, and a steamer was anchored across the end exposed to the weather. By pumping rapidly the hull was raised to the surface and, upon inspection, was found to be in need of only a reasonable amount of overhauling. The vessel has a cargo capacity of 3,600 tons.

¶A chemical concern has prepared a traveling exhibit giving a comparison between American and German dyestuffs, which has aroused much interest because of the manifest excellence of the American products shown.

THE CAMPAIGN OF THE CAVES

By BRANDON TRACY

The text of this article has been passed by the Chief Military Censor.

"CITIES on fire! Germans evacuating!" cry the newspaper headlines. "We'll be in Brussels next week sure!" comments my neighbor. "Why not, if they're getting out?"

Next week's papers do record a considerable advance. The allies occupy nearly five miles of territory that has been contested stubbornly on a twenty-mile front. But Brussels? Probably the Hun tenants are just contemplating signing up another year's cutthroat lease. They know the allied ranks, although advancing rapidly, will not be able to oust them for a long time—and they know why. With the cunning of scientists, driven insane by the maniacal demands of German warfare, they have prepared every foot of evacuated territory so that the victorious allies and the returning peasantry will find it a constant nuisance, threat, and menace. Each spring has been doctored so that the clear water, bubbling up, passes through a one-foot layer of sand intermingled with crystals of poisonous substances. For weeks it offers satiation of thirst—and death. The wells are fixed in like manner, or are crammed with the putrefying bodies of horses. Each knoll, each probable site for a hospital, ammunition dump, battery emplacement, or battalion headquarters has been mined. Deep in the ground somewhere a terrific charge is waiting, finally to be detonated by a time fuse that may take ten days to reach the high explosive. The trenches and dugouts abandoned often are mined in such fashion that the entry of hostile troops will cause an explosion that caves in the walls. There is a quality about such a catastrophe which tickles Fritz's instinct for *schrecklichkeit*. It is the same instinct, perhaps, which prompts lawless urchins of ten or twelve to place a bucket of water at the top of a half-opened door, so that anyone entering will be drenched. The urchins get this whipped out of them—and so will Germany.

Before the infantry and artillery can take possession of the regained territory, or the happy French or Belgian peasant start tilling the war-corroded soil, the allied engineers must examine it painstakingly. All the swampy regions from which poison gases are emanating must be neutralized, all wells and springs must be cleansed, and all mines either exploded or rendered impotent. This is the ideal; in actual practice often it is advisable for troops to pursue a fleeing enemy even at the risk of many casualties from his devilish devices, but wherever ordinary conditions prevail the advance awaits the O. K. of the engineering sections.

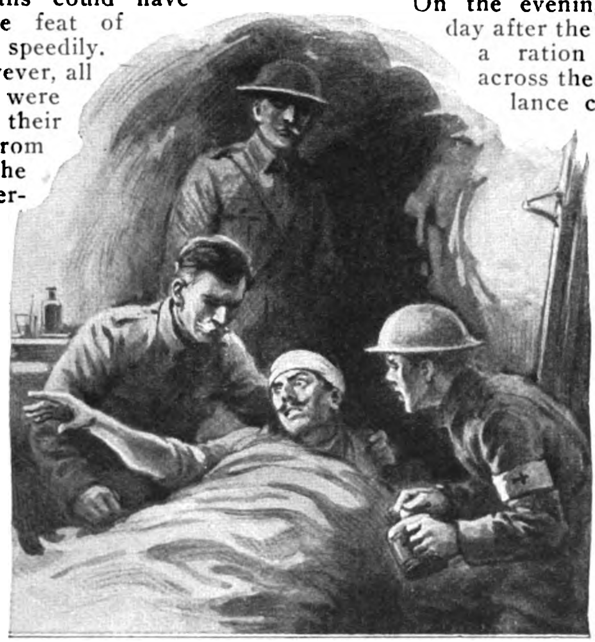
The mechanical and scientific death traps are not always all that Fritz leaves behind when planning the victorious enemy's destruction. Sometimes the retreat is not sincere; it merely masks a terrible ambush, calculated to cut off and wipe out a battalion or more of allied troops. What was perhaps the greatest large-scale example of this sinister strategy occurred during the allied advance in the Mount St. Eloi sector during which the great caves of Zivy were captured.

Canadians and French had been cooperating on this front, which in peace times had been the limestone quarry of western Europe. Great holes lay everywhere, some one thousand feet in width and a hundred feet deep. At the bottoms of many, passages led to underground chambers, and out to other excavations. Here and there, in the uncut brush on the surface, unsuspected air holes waited the feet of the incautious explorer.

Because of the rock hoists and the narrow-gauge tracks the Germans found in these caves and excavations, they had been able to set up quarters of comparative luxury. The dugouts were carved holes reaching into the solid rock, shellproof and easily warmed in winter. The officers all had subterranean chambers, and in many of these were complete wine cellars and stocks of provisions taken from the civilian homes in the towns they had pillaged. Naturally the Germans hated to give up this position for the open trenches in the plain to the east.

A concerted attack by the French and Canadians, however, drove them from a ridge which commanded many of the excavations. From the top the allied guns poured projectiles of all kinds to the depths of the open quarries. In spite of frantic counterattacks the Huns found themselves compelled to give way. It even looked as though, because of the difficulties of transporting their matériel, some prisoners and a great deal of booty would have to fall into allied hands. The appetites of the Canadians, in particular, had been whetted by tales recited by German prisoners. These men had described some of the luxurious caves occupied by the officers, and as a result every Canadian promised himself a treat when the enemy was driven out and the process of consolidating the new position began. Everyone looked for a stubborn fight, however.

Then one morning the Germans had departed. Their new line was in rapid process of construction nearly two miles to the east. Not a German remained visible in the region of Zivy Caves! The allied officers rubbed their eyes. This was almost too good to be true! Without even a bayonet charge they had won this coveted position! As they advanced slowly and cautiously, all speculated on how the Germans could have accomplished the feat of withdrawing so speedily. At this time, however, all the allies still were learning much of their military science from the enemy, and the perfection of German methods still was undisputed. One rather expected the Huns to accomplish near - miracles in making war; hadn't they been studying it all out for half a century? It would have taken little argument then to convince all of the men and most of the officers that this very move had been planned years before in Potsdam—as perhaps it had. The men, at least, were willing to let the Huns accomplish all the retreating miracles they wished, so long as each time they left their champagne cellars and kilometers of fresh sausage behind.



"On reaching the dressing station, the poilu regained his senses for a time, and told a startling story. . . . .As they were crossing a space of heavy grass and weeds on apparently solid ground back of the lines, the earth had given way beneath them. They fell many feet and landed in the midst of a huge German encampment."

They had left a great deal of this behind on this occasion. Perhaps it was too much to ask that they save all of their war matériel and their sausage in one night, but knowing Fritz, one could scarcely imagine him leaving the sausage. The Canadians and a small body of French moved in and occupied the intricate system. The moment danger of immediate enemy attack seemed to have passed, and consolidation of the new positions was well under way, something like a barbecue started. The Canadians in particular, though "fed up" on bully beef and hardtack, still had appetite for all of Fritz's stolen comforts. Many lean men from the plains of Saskatchewan made a good start in two days toward corpulency.

In the light of after events, this must have been just about as the German command had figured. Had nothing occurred to prevent, the feasting men would have paid a high price for their two days in the German quarters.

On the evening of the second day after the capture, however, a ration party stumbled across the body of a French lance corporal who had been sent on patrol duty early in the day. The man was unconscious, with a badly smashed shoulder and arm, and a bayonet thrust in the abdomen. On reaching the dressing station, the poilu regained his senses for a time, and told a startling story. He and the private with him, it seems, had started to reconnoiter just before dawn. As they were crossing a space of heavy grass and weeds on apparently solid ground, the earth gave way and they fell many feet. The private was killed, but the lance corporal, though badly injured, was still conscious. He had fallen in the midst of a huge German encampment!

While he was lying there he attempted to lift himself, and a German had run him through with a bayonet. Then he had been thrown into a corner for dead. During flitting periods of consciousness he managed to make out that the force was stationed in one of the largest of the caves. Without mistake it was waiting for something. A few of the phrases he caught led him to believe that it was an attack upon the Canadians. That evening he had managed to crawl away without being observed, and had mounted one of the rude ladders painfully, step by step, until he fell in the grass outside on the surface.

The astonishing story was taken seriously enough by the commander of the French forces, though the Canadians were a little inclined to scoff. Several patrol parties were sent out, and came back with the tremendous news that fully half a German division was hidden down in a series of adjoining caves, evidently preparing for an attack in force upon the rear of their old positions. They had cut off the caves they occupied by blocking up the old entrance with stones and camouflaging it well with branches and dirt. The allied soldiers had not suspected that any more of the caves existed. That night a force of Canadians and French surrounded the air holes and the old entrance. A message was dropped down, demanding instant surrender on the part of the forces in the caves. No reply of any kind was made to this, but suddenly the old entrance was blown out, and the German picked troops attempted a sortie. Hundreds were slaughtered as machine guns played across the entrance.

Then the defenders drew back, evidently to try new ways of egress. The few that came up the ladders to the air

"That night a large force of Canadians and French surrounded the air holes and the old entrance. . . . Suddenly the old entrance was blown out and the Germans attempted a sortie. Hundreds were slaughtered as machine guns played across the entrance."

holes were knocked back or shot, and then the gas tanks were brought up. For two hours a steady stream of the poison gas the Germans themselves had brought into "civilized" warfare, streamed down into the caves. Then a white flag was sent up, and the remnants of the Germans, choking and black in the face, came up and surrendered.

Over eight hundred of them were dead in the caves, either from the concentration of gas or from the attempts at sortie. Nearly four hundred prisoners gave themselves up at the air holes, while over three thousand stumbled blindly out of the old entrance, crying *"Kamerad!"* Every particle of the war matériel taken with them into the caves for the destruction of the Canadians fell into the hands of the allies.

From cross-questioning of prisoners it was found out that at 4 a. m. a concerted attack was to have been made by this force and by the German troops in the new positions, the object being to wipe out the hated Canadians, regain the old position, and perhaps create a dangerous break in the allied lines before reserves could be brought up.

Promptly at four a tremendous explosion took place near the new German lines, and their ranks came over in the expected attack. They had learned nothing of the disaster which had befallen their comrades. They met a solid wall of resistance, and in twenty minutes had piled their dead as high as a breastwork on the strip of ground above the caves. The attack was shattered completely, and some of the remnants of the storming troops were taken prisoners.

King George of England bestowed the Victoria Cross on the dead lance corporal, while the government of France also gave him the highest military honors. While in mortal pain, he had thought of his country and of the forces from overseas who were fighting for his country, and had saved them from probable annihilation at a dreadful cost to himself. His name, Hémin Gouraud, will go down in the annals of two great nations as one of the greatest of military heroes.

PLANS OF LARGEST DRY DOCK FOR NAPLES APPROVED

Evidence of the great industrial awakening which is taking place in Italy is to be found in the proposed great dry dock for Naples, plans for which have been approved by the government. It is said that this will be the greatest dry dock on the Mediterranean. The projected improvements also include the construction of an industrial port.

¶ Among the high rates recently paid for freight shipments from Buenos Aires to New York and Boston are $90 per 40 cu. ft. of space for wool, $120 per ton for tallow, and $80 per 50 cu. ft. for cheese.

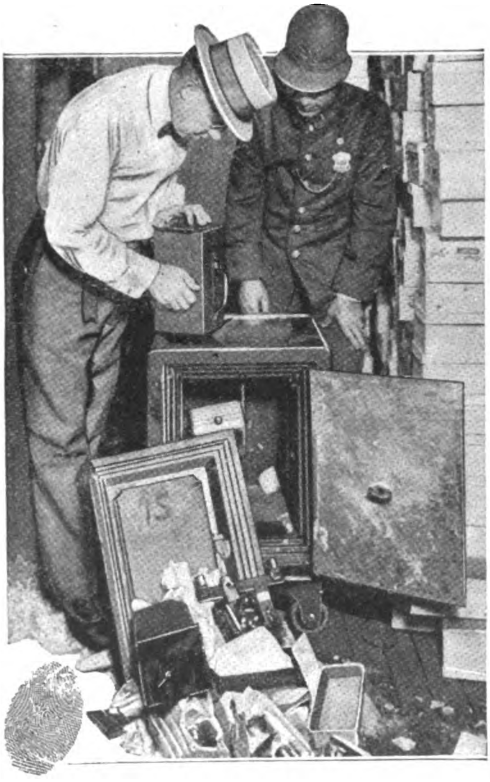
FINGER-PRINT PHOTOGRAPHY AIDED BY SPECIAL CAMERA

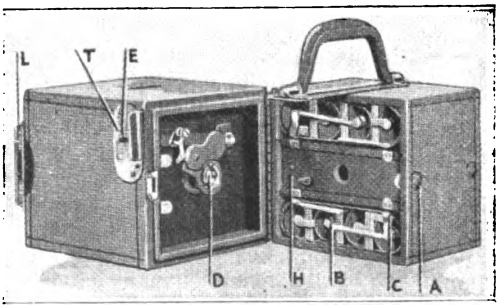
Of considerable importance in criminal detection is a new finger-print camera that is coming into use. The instrument is of compact size and of such simple operation that its successful use does not depend upon expert knowledge of photography. It accommodates either plates or films, and makes full-sized reproductions of details included in an area 2⅛ by 3⅛ in. The instrument is equipped with four small incandescent lamps operated by batteries contained in the camera housing. They are mounted in an accessible position back of the front aperture and are automatically switched on, supplying brilliant illumination, as the shutter is actuated. No thought has to be given to focusing, for all pictures are taken with the front opening of the camera pressed firmly against the surface on which the finger print, or other subject, is located. Incidentally the instrument is also adapted for making photographic reproductions of signatures and certain other things.

PICTURES BRING WAR HOME TO THE PEOPLE

That photography has played a larger part in the great war than in any previous conflict is strikingly illustrated by the extensive work of our government in procuring and exhibiting official photographs. Still and motion pictures have been taken in great numbers, chiefly by Signal Corps units, to be used as historical records and as propaganda. All negatives and prints received from overseas have been delivered to the general staff at Washington, and duplicate negatives, of no value to the enemy, have been released for various forms of publicity. Official war films, such as private concerns would have had much difficulty in procuring, have been exhibited in thousands of motion-picture houses and all rental fees paid therefor have been used to exhibit pictures gratis in cantonments and at the front. They have also been shown with good effect in foreign lands where American and allied propaganda was needed. In many respects the pictures have had greater force than printed matter in keeping up the morale of the people "back home," and in counteracting the German lies which were spread with such pernicious vigor before the Teutonic decline set in.

¶In one year $35,000,000,000 of war-risk insurance has been written by the government for its fighting men. This is practically equal to the amount of ordinary life insurance outstanding with all the life-insurance companies in the world at the beginning of the war. Furthermore the sum represents policy holders embracing more than 90 per cent of the personnel of the army and navy.





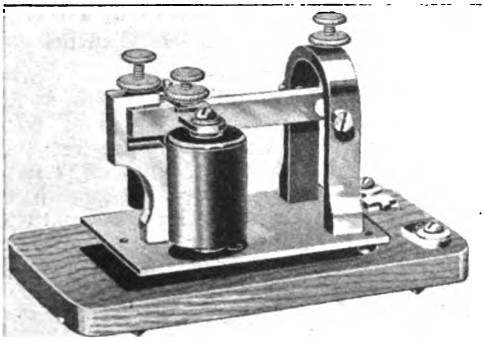
Left: Finger Prints Left by Yeggmen on Top of Looted Safe are being Photographed. In the Lower Left-Hand Corner Is a Reproduction of a Finger Print. At the Right is Shown the Interior Arrangement of the Camera: L, Plate Holder; T, Registering Line; E, Exposure Lever; D, Anastigmat Lens; H, Independent Light Switch; B, Batteries; C, Contact Points, and A, Locking Button

ARMY AIRMAN MAKES NONSTOP OCEAN-TO-OCEAN FLIGHT

Major W. W. Wynne, of the 79th Aero Squadron, holds the distinction of having made a nonstop transcontinental flight in 34 minutes. Carrying U. S. mail and Liberty-bond applications, he left the Atlantic seaboard at 9:31 a. m. and reached the Pacific side at 10:05 a. m. The ocean-to-ocean flight, the first that has been accomplished by an aeroplane carrying mail, was made October 19 at the Canal Zone. The distance traversed is approximately 38 miles.

TELEGRAPH SOUNDER USES ALTERNATING CURRENT

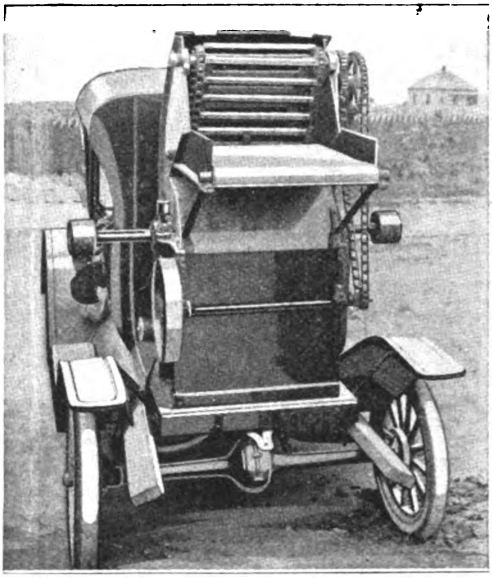
A sounder now being introduced in telegraph stations, particularly in towns and villages where direct current is not available, can be used on any 110-volt, 60-cycle, alternating-current circuit, thereby eliminating the trouble and expense occasioned by the use of batteries. The amount of current required is so small that the cost of maintenance is very low. While in general design the instrument resembles standard sounders now in use, a special feature of this instrument is the abbreviated armature which moves between extensions of the magnetic-spool cores which point toward one another.



Sounder for Telegraph Office, Which can be Used on 110-Volt Alternating-Current Circuits, Thereby Eliminating the Trouble and Expense Due to Batteries

AUTO CARRIES AND DRIVES SALESMAN'S SAMPLE

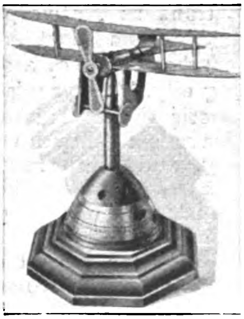
An interesting example of the manifold serviceability of an inexpensive runabout is furnished by a salesman who sells grinding machines to farmers. He carries one of his machines on a platform at the rear of his car and, by means of skids which he takes with him, quickly lowers the grinder to the ground when there is prospect of a sale. The rear of the car is then jacked up, and a belt, running over a special pulley on the rear axle, transmits power from the car to the grinder.



Rear View of Salesman's Automobile Carrying Sample Grinding Machine, Which is Placed on the Ground for Demonstration Purposes and Driven by the Car Engine

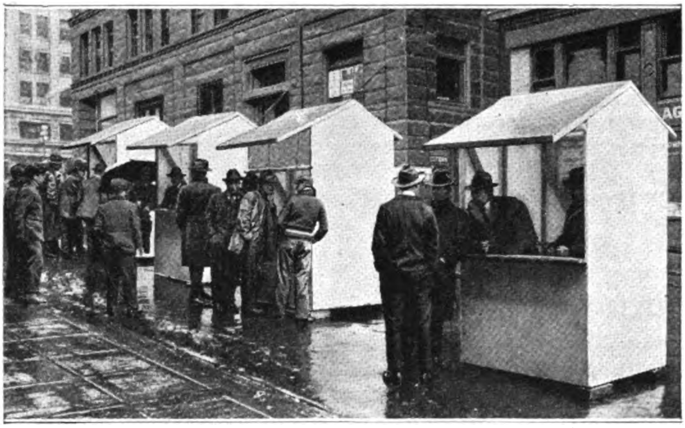
MINIATURE METAL AEROPLANE RELIC FROM FLANDERS

Among the mementos of the war that are constantly finding their way to America is one from "Flanders' fields" that is oddly representative of three arms of the military service. It is a model aeroplane constructed of trench souvenirs by a British Tommy. A shrapnel head surmounted by a Mauser rifle cartridge forms the base and support for the tiny craft, the body of which consists of a second cartridge fitted with wings made of brass, probably taken from a shell casing. The propeller and running gear are made of aluminum.



OFFICE MOVED INTO STREET TO ESCAPE INFLUENZA

When the Spanish influenza epidemic broke out in Seattle the officials conducting the government's employment office for shipbuilders decided, as precaution against contagion, to move their desks into the street. Booths consisting of wooden frames covered with canvas were used to shelter the employes and the office furniture necessary for carrying on work with the men who gathered on the pavement seeking jobs.



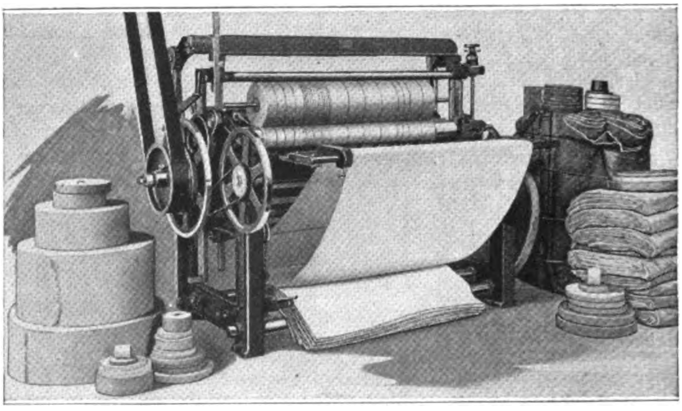
Booths Sheltering Employment-Office Clerks in Seattle, Washington, Who, during the Influenza Epidemic, Moved Their Desks into the Street and Transacted Business in the Open Air

AERIAL WAR ENTERS NEW PHASE AS HUN BEGINS TO WEAKEN

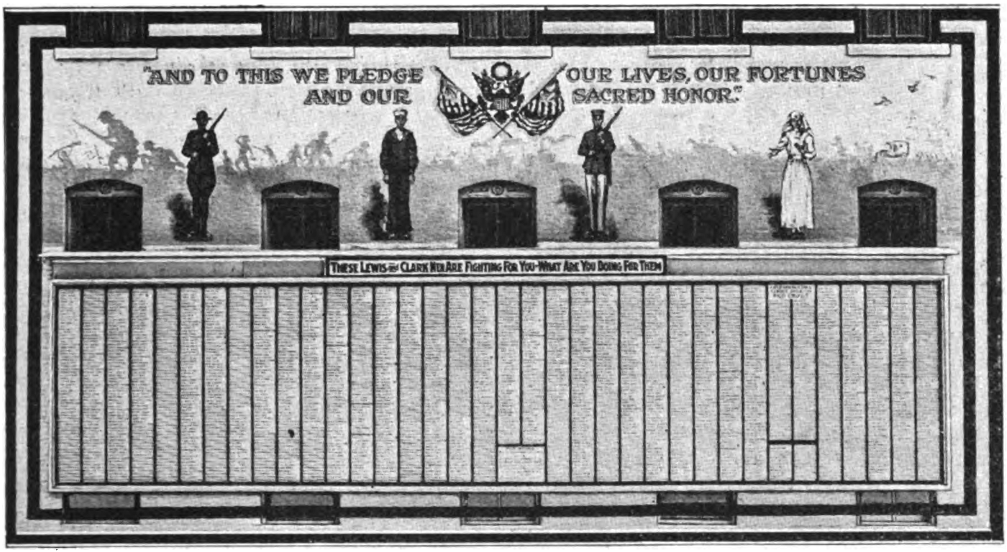
Since that eventful night in 1914 when a German Zeppelin, shrouded in darkness, slipped above the fortifications at Antwerp and began the first aerial bombardment of a sleeping city, Tennyson's prophetic lines, "Heard the heavens filled with shouting, and there rained a ghastly dew from the nations' airy navies, grappling in the central blue," have been quoted and requoted. No single incident, however, has served so fittingly to recall their significance as that of a few weeks ago when an American bombing program was executed with amazing dash by a fleet of 350 machines. It is doubtful if on any previous occasion during the four years of aerial warfare so large and impressive a group of aeroplanes has flown in formation. Two hundred and fifty bombing planes protected by 100 pursuit machines dropped 32 tons of bombs on German cantonments between Wavrille and Damvillers, a few miles north of Verdun. Only one of the vessels failed to return to its base. The cheering news of this great feat, which it it is safe to say might at any time have been surpassed, had not Germany begged for an armistice, was followed by the announcement at Washington of an agreement to group the aerial navies of the allies so as to effect unified command as well as coöperative production of all the various kinds of air craft.

NEW TIMESAVING MACHINE FOR RED CROSS WORKERS

The effectiveness of Red Cross workers' services is multiplied many times by the use of a machine, designed particularly for Red Cross headquarters and other of its large centers, which slits full-width goods suitable for surgeons' bandages and rewinds it into large rolls at the rate of 50 to 100 yd. per minute. These rolls are intended for distribution among



A Machine That Saves Time and Labor for Red Cross Volunteers: With It a Bolt of Cloth can be Cut into Bandage Widths and Rewound at the Rate of 50 to 100 Yards per Minute


"AND TO THIS WE PLEDGE AND OUR
OUR LIVES, OUR FORTUNES SACRED HONOR."
THESE LEWIS & CLARK MEN ARE FIGHTING FOR YOU–WHAT ARE YOU DOING FOR THEM

This Honor Roll, Listing the Men and Women from Lewis and Clark County, Montana, Who Are in Their Country's Service, can be Expanded as Required and the Names Kept in Alphabetical Order. The Names are Printed on Pieces of Cardboard and Held in Place by Vertical Wooden Strips with Grooved Edges

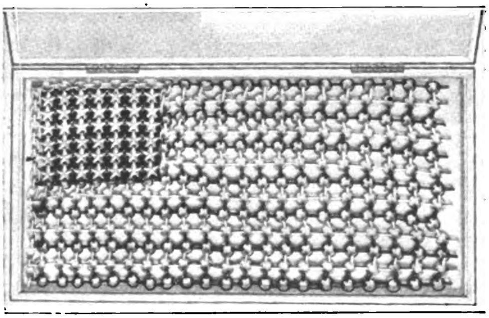
volunteer workers, who make them into smaller rolls of regulation size. The machine is belt-driven, and the bolt goods is fed through a set of small rollers, cut into strips of desired width, and wound onto a rod without any waste of material. No special skill is required to operate the machine. A measuring attachment records the number of yards passing through the cutter.

DISTINCTIVE HONOR ROLL IN HELENA, MONTANA

The problem of providing an attractive honor roll at not too great cost, on which names can be listed alphabetically regardless of additions made from time to time, has been solved by Helena, Mont. The roll occupies part of a wall of a brick building and measures 20 by 36 ft. The lower half of the space is devoted to the names which are arranged in columns against composition board backed with horizontal strips. The names are printed on weatherproof pieces of cardboard and are held in place by vertical wooden strips having grooved edges. On the upper half of the wall space are painted four uniformed figures, one of which is a Red Cross nurse, standing against a background representing troops going into action. A red, white, and blue border incloses the whole board. The cost was $500, approximately. The adding of new names to this big roll is made a formal occasion at which relatives of the departing soldiers place the names in their proper places in the presence of a large audience.

HAND-CARVED FLAG A MESH OF WOODEN LINKS

One of the most curious American flags in existence has been carved from a ¼-in. board by a cabinetmaker in Alaska. This single piece of wood was fashioned into a mesh consisting of 1½-in. links and stars—771 parts in all—which have never been apart. More than 1,500 hours were spent on the task. The flag measures 10¾ by 22¾ in. and is kept in a suitable wooden case. The red and white stripes are painted on alternate rows of links and a blue background is provided for the stars, which are white.



American Flag Consisting of 771 Interlocking Pieces Carved from a Single Board One-Fourth Inch Thick: Over 1,500 Hours were Spent on This Task

TRAINING REPAIR MEN FOR THE ARMY

By GRANT M. HYDE

"WHO fixed your car?"

"The soldiers."

"The soldiers?"

"Sure—student soldiers at the university. Never cost me a cent. Overhauled it completely—for practice. And the boy who did the job should be marked 100—she runs like new."

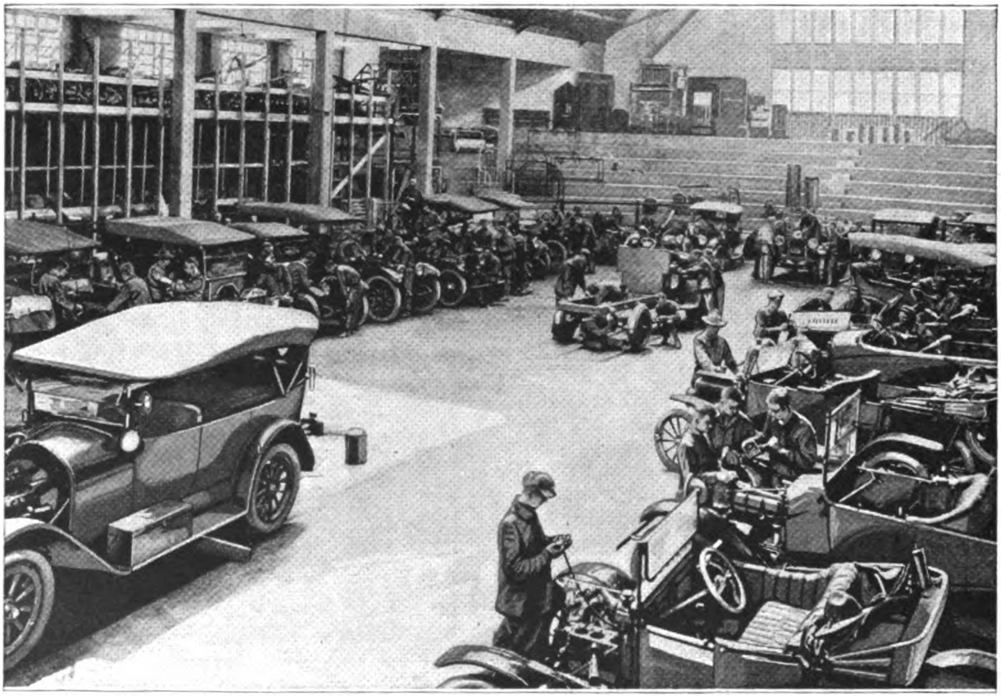
Common enough auto talk in Madison, Wis., the home of the University of Wisconsin, in whose shops 380 skilled gas-engine repairmen have been trained for the army in the past six months, and about 280 more are now acquiring skill as army-truck specialists, auto mechanics, tractor operators, and motorcycle repairmen. All are members of the army vocational detachment which the War Department established at the university last spring.

Many cars are needed for the men to work on, and citizens were invited to bring in their autos for overhauling. The first to respond did so hesitatingly and only in a patriotic spirit. When they drove out their cars, after the practice overhauling, they thought they had new ones. Each had been taken to pieces from radiator to tail light and carefully rebuilt.

Auto repairing is only one of a dozen, or so, army trades that soldiers learn in an eight weeks' course at the university. At present those in training include 150 radio operators, 70 truck specialists, 10 concrete foremen, 130 auto mechanics, 30 tractor operators, 50 motorcycle-repair men, 20 blacksmiths, 70 carpenters, 30 surveyors, 60 topographical draftsmen, 40 gunsmiths, and 40 general machinists.

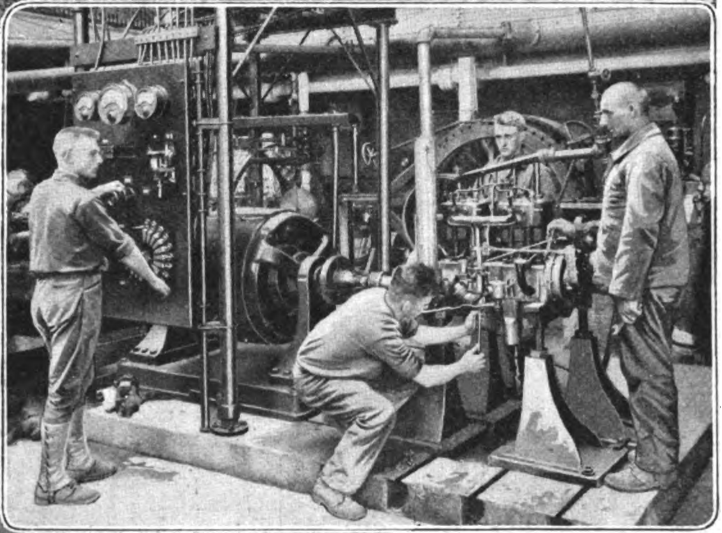
In the past six months, besides the 380 gas-engine specialists, the university's vocational unit has trained 292 electricians, 60 sheet-metal workers, 226 woodworkers, 112 carpenters, 160 gunsmiths, 160 machinists, 40 radio operators, 40 radio constructors, 50 cement foremen, and 80 blacksmiths, prior to the present detachment.

Practical problems are a feature of the work. The carpenters of the third detachment, for example, did practically all the work of erecting seven barracks in which the fourth detachment is quartered. Mechanics in other lines did other work on the buildings, including practically everything except plumbing, making them ready for the uses to which they have since been put.



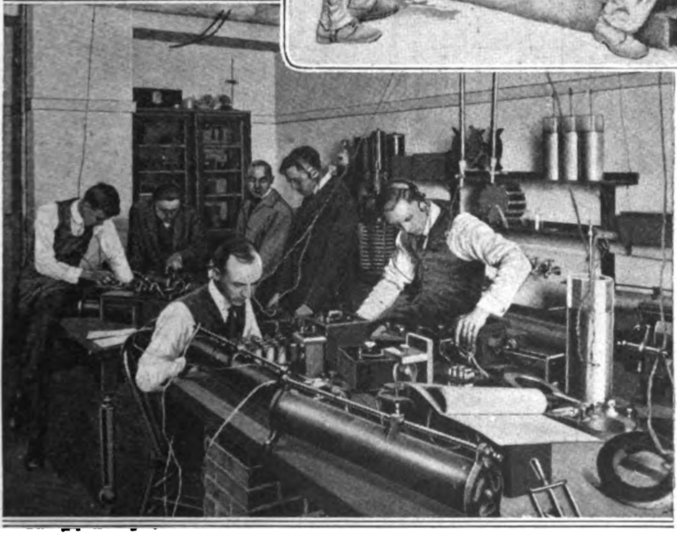
The Stock Exposition Pavilion of the College of Agriculture, Where as Many as 280 Student Soldiers at the University of Wisconsin have Taken the Course in Motor-Car Repair at One Time

Teaching Army Blacksmithing in the Shops of the College of Engineering



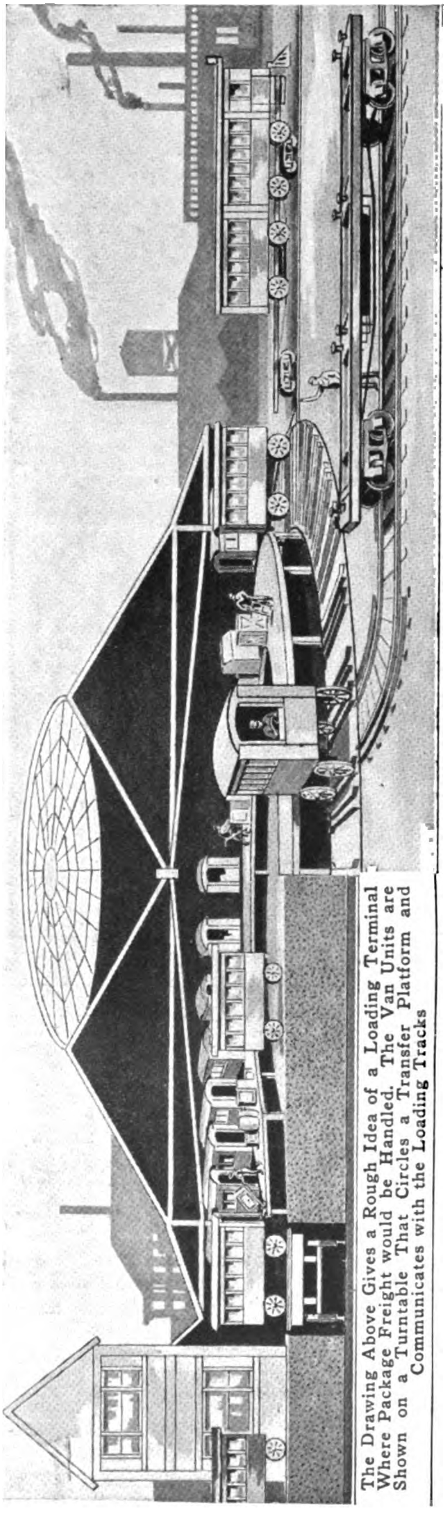
Prospective Army Electricians Receiving Training: Nearly 300 Young Men have been Graduated from This School

Cement students helped lay roads in and near the city and did the concrete work for a large ornamental terrace on the campus. Broken guns and broken airplane parts are used in other classes. Every man prepares to do a particular kind of mechanical work which the army needs to have done.



One of the Radio Laboratories in the Physics Building at the University of Wisconsin, Where Men are Trained for the Signal Corps: There Are Two Long-Range Receiving Stations for Practice Work

¶For the convenience of its many women employes, the management of a large munitions factory has induced a department store in a neighboring city to establish a branch store at the plant, so that now shopping privileges and pleasures are brought within easy reach of all the workers.



The Drawing Above Gives a Rough Idea of a Loading Terminal Where Package Freight would be Handled. The Van Units are Shown on a Turntable That Circles a Transfer Platform and Communicates with the Loading Tracks

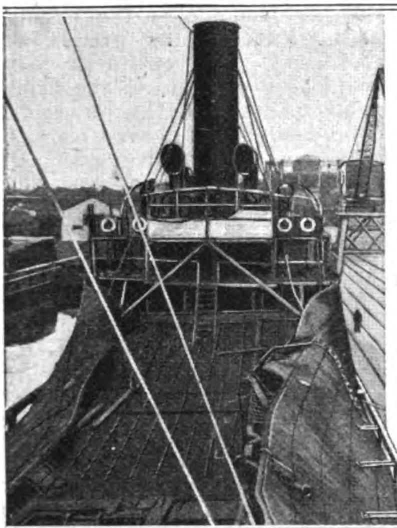
One of the Particularly Interesting Features of the Plan Is That the Loading and Unloading of the Major Number of the Van Units would be Accomplished at the Warehouses of the Shipper and Consignee, Eliminating All Rehandling at Terminals and Thereby Facilitating the Rapid Movement of Freight

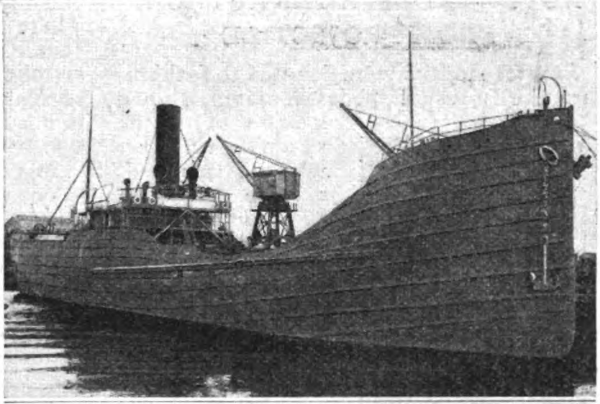
VAN-CARRYING CARS PLANNED FOR SMALL LOTS OF FREIGHT

Quite an interesting method, the practicability of which yet remains to be demonstrated, has been suggested for facilitating the handling of less-than-carload freight. Despite the fact that the system depends upon the adoption of a radically new type of rolling stock, the plan is credited with having attracted the serious consideration of engineers representing certain transportation and car-building companies. The purpose of the scheme is to eliminate the rehandling of small shipments of freight, by providing means for their dispatch direct from consignor to consignee. It is proposed that this be accomplished by constructing and operating what might be termed segmented cars. One of these would consist of a specially designed chassis adapted to carry several horse-drawn or motor-trailer van units of approximately five-ton capacity. These members would be substantially built of steel and so arranged and vestibuled that, when loaded astride the chassis and locked end to end, they would present an unbroken car-body alinement. Obviously any of several methods might readily be employed for loading the vans on a carrier car and subsequently removing them upon arrival at their destinations. It is considered that it would be possible, for instance, to line a number of the units astride a railway track, move carrier cars beneath them, and accomplish the loading and centering with pneumatic aid. Unloading might be accomplished by reversal of the procedure. When placed on the ground in a terminal yard, a van unit would be drawn by horses or trailed by a motor truck to its final destination and there unloaded. The plan contemplates the construction of carrier cars of types adapted for various conditions. For interurban use some would be self-propelling.

BUCKLED STEAMSHIP IS BRACED FOR VOYAGE TO HOME PORT

Unusual measures were taken to enable the British steamship "Netherton" to put to sea from Singapore for a home port where repairs could be made, after it had been seriously damaged by a benzine explosion and fire in its hold. The upper part of the steel hull on both sides of the ship collapsed forward of amidships. To prevent further buckling, a long steel beam was placed along the





The Photograph at the Left Gives a Deck View of the Buckled Ship and Also Shows How the Reinforcing Beams were Fixed in Place along the Sides of the Hull. Another View is Presented Above, Which Clearly Indicates the Length of the Beams That were Used, One on Each Side

exterior of both sides. They spanned the sunken portions and were held firmly by right-angle brackets that were riveted to the hull. Reinforced in this manner, the freighter was able to limp home without being battered to pieces at sea.

YANKEE AIRMEN ARE EQUIPPED WITH NEW OXYGEN OUTFITS

Prior to the signing of the armistice the War Department had announced that all American airmen using combat, reconnaissance, and bombing planes would be supplied immediately with oxygen-breathing apparatus for use at high elevations in the war zone. The devices, recently adopted as standard equipment, are being manufactured in sufficient quantity to meet all requirements. The tanks carry enough gas to last six or eight hours, and enable fliers to remain at great altitudes for long periods without suffering from the effects of the rarefied atmosphere.

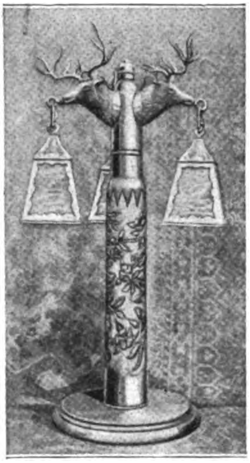
GIVERS PIN MONEY TO BAG HUNG IN PUBLIC SQUARE

When a resourceful member of the Red Cross at Anderson, S. C., suggested that a bag be hung in the public square to receive discarded samples of cotton from dealers and small gifts of the same product from farmers, the idea proved unexpectedly profitable. One day some one, in lieu of a cotton gift, pinned a $5 note to the bag. It was decided to allow the bill to remain as a suggestion to others. In less than 10 days $600 in cash, besides many pounds of cotton, had been collected by the bag. The idea was soon copied in neighboring towns with good results accruing in each instance, according to information at hand.

HELP YOUR SICK AND WOUNDED
BAG YOUR COTTON —— THE BOYS WILL BAG THE HUNS

This Bag, Placed in the Public Square in Anderson, South Carolina, to Receive Gifts of Cotton, was Soon Covered with Bank Notes, as Well as Filled with Cotton—All for the Red Cross

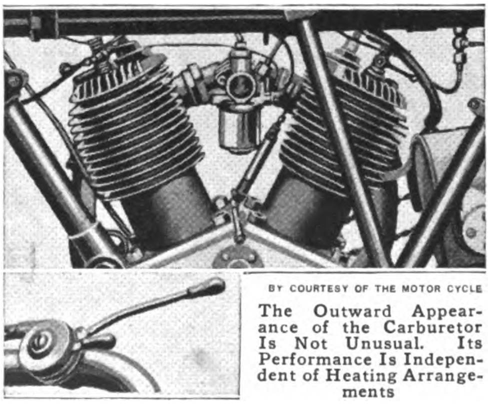
NOVEL PEDESTAL LAMP MADE FROM PROJECTILE



Several months were devoted to fashioning the unusual pedestal lamp shown herewith, the standard for which is made of a large projectile. The lamp stands 34 in. high and the lower portion of the upright is elaborately embossed with a twining vine and other figures. This work was done with a cold chisel, punch, and hammer. Three deer heads, of cast brass, are mounted on three sides of the projectile at the upper end, and from each hangs an ornamental lamp. At the top of the standard is a time fuse.

BRITISH CARBURETOR PERMITS MOTOR TO BURN KEROSENE

Astonishing claims are made for an automatic carburetor that has been developed of late in England. The details of its construction are withheld, but its performance is said on good authority to be remarkable. During a demonstration test it was used on a 2-cyl., 6-hp. motorcycle. The start was made with the engine cold and the float chamber half filled with gasoline. The change to kerosene, while under way, produced no noticeable difference in the performance of the engine. There was no knocking on grades, no smoke, no odor. The cylinders fired crisply, the pick-up was quick, the firing regular at all speeds, and the power all that could be desired. It is even claimed that, with the new carburetor, a gallon of kerosene will drive the motorcycle and sidecar the unheard-of distance of 98 miles. It is not understood, however, that an official test has been made as yet in support of this statement.

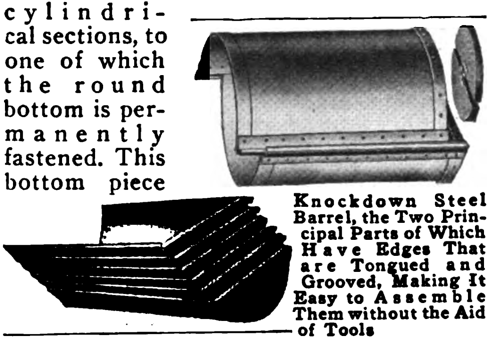


BY COURTESY OF THE MOTOR CYCLE

The Outward Appearance of the Carburetor Is Not Unusual. Its Performance Is Independent of Heating Arrangements

KNOCKDOWN STEEL BARREL SAVES STORAGE SPACE

Of special interest to shippers of various commodities is a patented knockdown steel barrel, the parts of which can be nested into relatively small space when not in use. It is composed of two semicylindrical sections, to one of which the round bottom is permanently fastened. This bottom piece is divided into hinged halves which can be folded together for packing. One edge of each semicylindrical section is tongued and the other is grooved so that to assemble the barrel it is only necessary to fit the halves together and unfold the bottom. No tools are required for this task.



Knockdown Steel Barrel, the Two Principal Parts of Which Have Edges That are Tongued and Grooved, Making It Easy to Assemble Them without the Aid of Tools

DEPOT UNDAMAGED BY SLIDE DOWN STEEP HILL

In changing the position of a large wooden railway station near Moncton, New Brunswick, engineers found it necessary to move the building several hundred feet down a steep incline. In the midst of the operation the cables gave way and the structure tobogganed swiftly downhill. The spectators expected to see the building completely demolished. But to their utter astonishment it was practically uninjured by its sudden descent. It stopped within seven feet of the foundations prepared for it and stood facing in the proper direction.

GATHERERS OF CLAMSHELLS ENJOY RISE IN PRICES

Along certain rivers in the United States the gathering of clamshells to be used in making buttons has become several times more profitable than it was a few seasons ago, when the price was as low as $16 per ton. This season, on the Cedar River in Iowa, for example, the price at the outset was $37.50 per ton, and in the autumn it had advanced to $60 per ton. This was for unsorted shells, while in former years the shells were sorted. Two men with a motorboat can easily gather half a ton in a day, it is said. Fully 100 tons were collected in one locality, where vats were provided on shore to free them of clams by steaming.

MOTORISTS PAY WITH AUTO FOR NEGLECT IN FOREST

Appalling forest fires often follow the thoughtless handling of matches or cigarettes, but it is seldom that the careless ones alone suffer so severely as did a party of motorists in a national forest recently. On leaving their six-cylinder car, within sight of a sign urging precaution in handling fire, one of the party threw away a cigarette unextinguished. Returning some time later, they found their car a heap of smoking ruins. Fortunately little damage was done to the surrounding forest.

Charred Remains of a Touring Car Burned in Fire Started by Throwing Away an Unextinguished Cigarette: A Few Feet from the Spot Was a Fire-Warning Sign Erected by Forest Rangers

FINE HONOLULU HOTEL NOW ARMY Y. M. C. A.

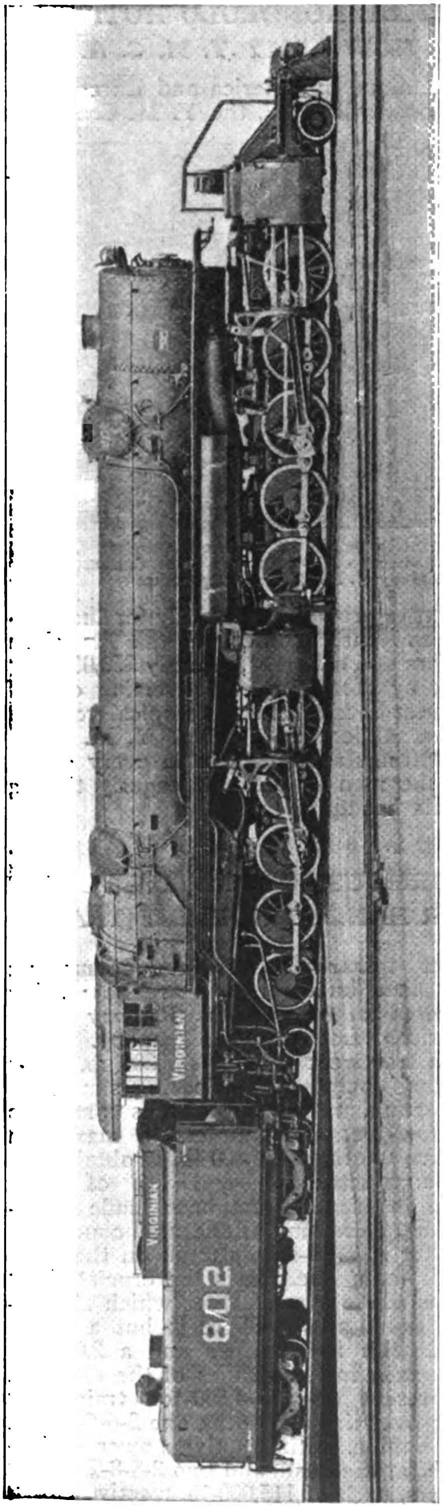
Not alone in America and Europe, but in far-away Hawaii, the Y. M. C. A. has sought to provide abundantly for the comfort and entertainment of the American soldiers and sailors. Recently $50,000 was spent by Honolulu in converting one of its finest hotels, set amid tropical verdure, into a soldiers' and sailors' Y. M. C. A. The fittings are complete in every detail, and the men in uniform eagerly throng to this headquarters daily.

One of Honolulu's Finest Hotels, Set in the Midst of Luxurious Tropical Verdure, Which at an Expenditure of $50,000 has been Converted into an Army and Navy Y. M. C. A. Headquarters

ENORMOUS LOCOMOTIVES BUILT FOR HANDLING HEAVY TRAINS

Ten remarkable Mallet locomotives have been built for, and are now being delivered to, the Virginian Railway by the American Locomotive Company. Each has a tractive power of 147,200 lb. when working compound. Working simple, as in starting, when live steam is carried to the low-pressure cylinders, a maximum tractive effort of 176,600 lb. is obtained.

The construction and use of these enormous engines has been made necessary by increasing traffic and conditions peculiar to a 14-mile stretch on the company's main line. It is the crucial point in the whole system, over which all tonnage must pass. There is but a single track, with five tunnels and a 2.07-per-cent grade for 11½ miles of the distance. At present 60-car, 4,500-ton trains are taken over the section by one 2-6-6-0-type road engine, with tractive power of 90,000 lb., at the head, and two 2-8-8-2 Mallet pushers, each of 115,000-lb. tractive effort,



One of the Ten Big Mallet Locomotives Built for Pushing Heavy Freight Trains over a Difficult Section of the Virginian Railway: The Engines Are So Ponderous That It Was Impossible to Deliver Them Completely Assembled

behind. These engines give a combined maximum tractive power of 320,000 pounds.

Hereafter, with the new engines in use, 78-car, 5,850-ton trains will be handled. One of the 2-8-8-2 locomotives now used as a pusher, will be placed at the head. Two of the big Mallets, with 20 drivers each, will be put behind as pushers. This arrangement will give a total tractive power of 409,400 pounds.

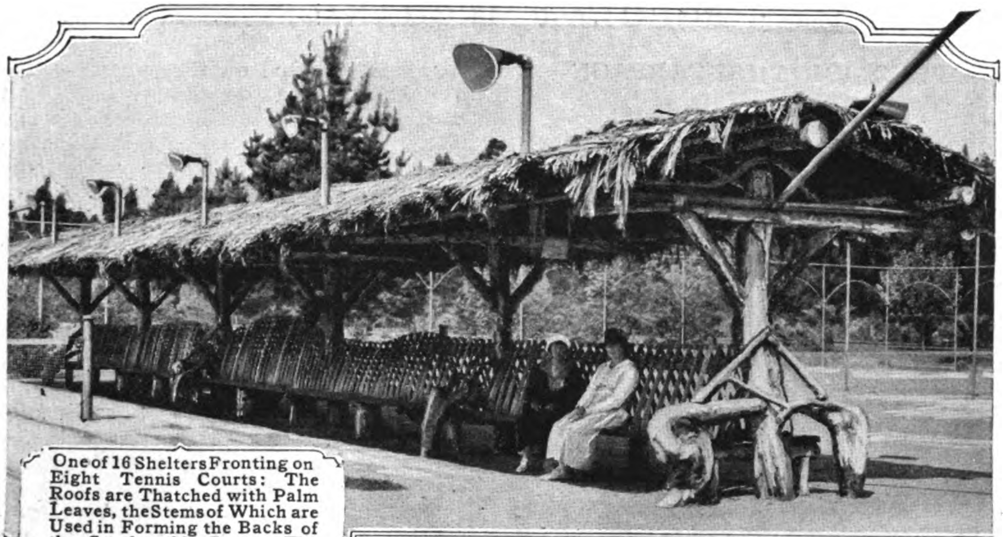
The new locomotives show an increase of 26.6 per cent in weight, 24.5 in heating surface, 61.7 in superheating surface, and 28 in tractive effort, over the 2-8-8-2 type pushers which they succeed and which, in 1912-13, when built, were the world's most powerful engines.

Delivery of the big Mallets from Schenectady, N. Y., to Princeton. W. Va., presented a difficult problem. It was impossible to ship them completely assembled and moving dead on their wheels. The boiler of each locomotive was left on the frames, but trimmed of all outside parts and projections. The cab, low-pressure cylinders, and other parts were removed, leaving a skeleton engine with its tender attached. For each locomotive a flat car, gondola, and box car were needed to carry the parts detached from it.

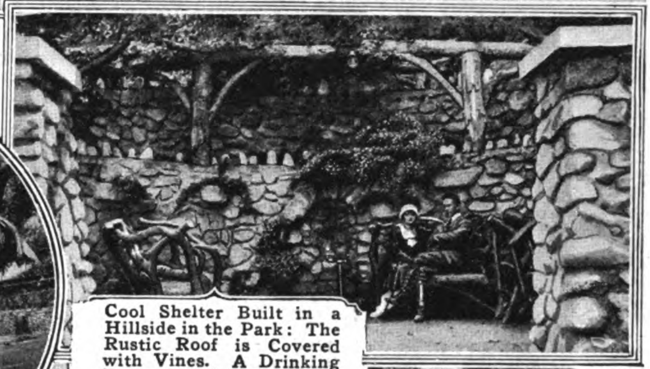
THATCHED SHELTERS ENHANCE PARK'S ATTRACTIVENESS

Thatched-roof structures of various types now add greatly to the public's enjoyment of a park in Pasadena, Calif., where many months of sunshine each year make very desirable some form of shelter for those seeking outdoor recreation. These protectors from the sun have been designed with regard to their artistic appearance as well as their utility.

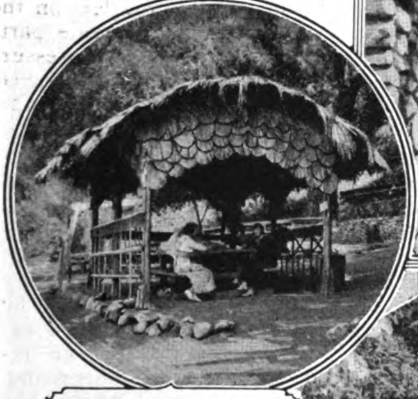
Because the scorching rays of the sun will soon harm the finish of an automobile body and ruin the tires, two sheds have been erected, one with stalls for 800 cars and the other with 200 stalls. Racks have also been provided for bicycles. Adjoining eight tennis courts, there are long rustic seats for spectators and players, each sheltered by a wide-spreading thatch roof, the thatch being made of palm leaves. There are 16 of these shelters in all, and on the roofs are lights with reflectors pointing toward the courts, which permit playing at night. Thatched structures of different design, but equally artistic, have been erected above the benches and tables where picnickers eat, while near by are stone stoves.



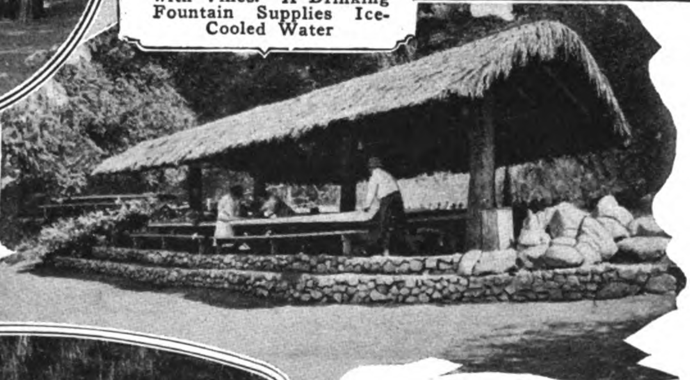
One of 16 Shelters Fronting on Eight Tennis Courts: The Roofs are Thatched with Palm Leaves, the Stems of Which are Used in Forming the Backs of the Comfortable Seats. The Lights, with Reflectors, on the Roof, Illuminate the Courts for Night Playing



Cool Shelter Built in a Hillside in the Park: The Rustic Roof is Covered with Vines. A Drinking Fountain Supplies Ice-Cooled Water



An Artistic Picnic-Lunch House of Bamboo and Palm: The Stems as Well as the Leaves have been Used



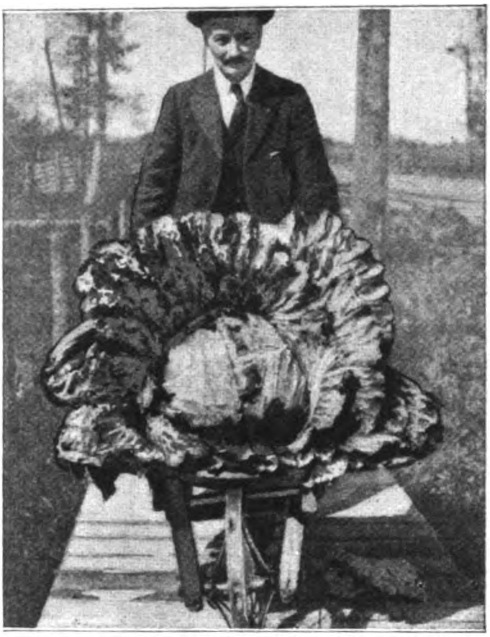
A Shelter for a Picnic Table and Benches That is Quite Different in Design from the One Shown in the Circle

One of Two Automobile Sheds of Which the Public Has Free Use: These Serviceable but Inexpensive Structures Have Stalls for 1,000 Cars

PHOTOS COPYRIGHT, JOHN EDWIN HOGG

PRIZE-WINNING CABBAGE FILLS WHEELBARROW

A cabbage which would satisfy the desire of the most ardent advocate of intensive gardening was recently exhibited at a community fair in Wisconsin. With its immense outer leaves this prize winner more than filled a wheelbarrow. That it was a first-class, compact head is indicated by the fact that it weighed 25 pounds.



Remarkable Cabbage Recently Exhibited at a Community Fair in Wisconsin: It Weighed 25 Pounds

FRESH MARKS ON PAVEMENT PROTECTED BY FRAMES

When it was decided to outline safety zones in the streets of a large city with white lines painted on the pavement, the problem of how to do the work without shutting off traffic presented itself. The difficulty was met by using 4-ft. slat-covered frames having cleats placed on the underside so that only the edges touched the pavement. These were laid wherever freshly painted lines needed protection, except in the case of lines paralleling the tracks, which were guarded by temporary railings.

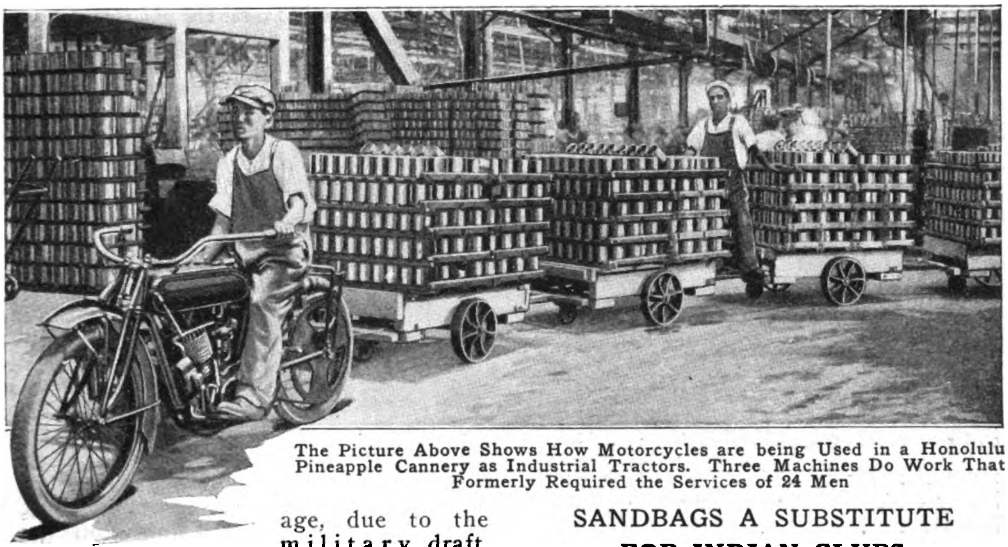
Street Pavement Marked with Freshly Painted Safety-Zone Boundaries, Which are Protected from the Traffic by Wooden Frames and Temporary Railings

DISCARDED AEROPLANE ENGINES FOR MOTOR CARS AND TRUCKS

Thousands of high-grade aeroplane engines have outlived their usefulness for flying and been retired. Thousands more will likewise be discarded when their war use is over. What disposition is to be made of them? This question, one that is not infrequently asked, has caused the principal of a Y. M. C. A. school for aeroplane mechanics to suggest that the government may become an important dealer in engines for motor cars. The life of an aeroplane engine is commonly stated to be 100 hours. This does not mean, however, that it is utterly useless after 100 hours of operation. What is meant is that in that period an aeroplane engine gives the "cream" of its service and becomes from 20 to 30 per cent less efficient than when new. It is therefore unsuited for further flying—at least for military flying. But upon being rejuvenated by overhauling, it is valuable in other capacities and capable of use for an indefinite period. It is not surprising, therefore, that the proposal should be made that America's discarded aeroplane motors be salvaged and utilized as automobile and truck motors. There is apparently nothing impracticable in the suggestion, providing the engines could be successfully reassembled into units of fewer cylinders and less horsepower. It goes without saying that motorists in general would not want to buy gasoline for 450-hp. Liberty motors installed in their family touring cars.

HIGH - POWER MOTORCYCLES USED AS INDUSTRIAL TRACTORS

New duties have been found for motorcycles in Honolulu. Three 18-hp., twin-cylinder machines are being used as industrial tractors in a large pineapple cannery. This peculiar adaption of the motorcycle was inspired by labor short-



The Picture Above Shows How Motorcycles are being Used in a Honolulu Pineapple Cannery as Industrial Tractors. Three Machines Do Work That Formerly Required the Services of 24 Men

age, due to the military draft. And now that the scheme has been given a thorough tryout, some interesting discoveries have been made. The motorcycle trio accomplishes work formerly demanding the services of 24 men. The machines do the work at less than one-tenth the previous cost, and with twice the speed and efficiency. They are used for pulling trains of loaded trucks from the factory's cooling floor to the warehouse, a distance of a fifth of a mile. They have been geared to a ratio of 25 to 1 in low, and 10½ to 1 in high. Each has a hauling capacity of 4½ tons.

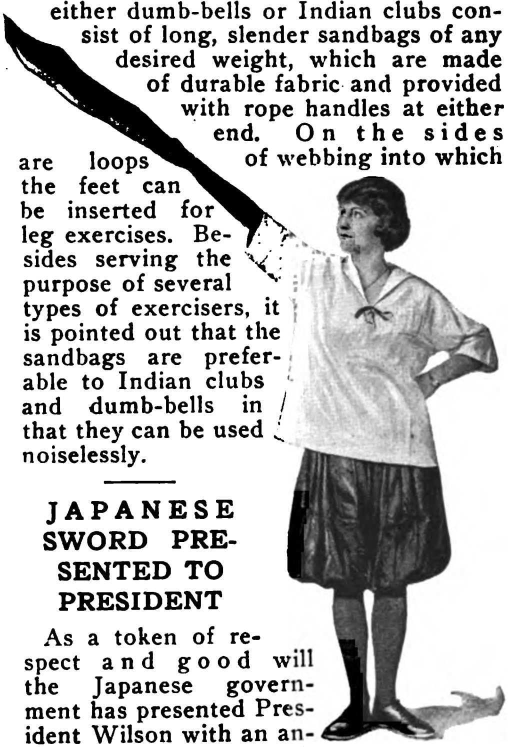
RECOVERING SULPHUR FOUND IN COAL MINES

The present scarcity of sulphur, a much-needed war material, is being relieved by concentrating the pyrite which is to be found in coal mines in Illinois, Ohio, West Virginia, and other states. In some instances the sulphur in this mineral has assayed more than 42 per cent. Besides relieving the present shortage, the recovery of sulphur in this manner promises to add materially to the income of the coal mines and make the importation of sulphur unnecessary.

¶A resolution has been adopted by the Merchants Association of New York recommending that all goods manufactured by its members in this country be marked "Made in the U. S. A." in plain type, and that all other marks intended to identify the country of origin be discontinued.

SANDBAGS A SUBSTITUTE FOR INDIAN CLUBS

New exercisers for home and gymnasium use which can be employed in place of either dumb-bells or Indian clubs consist of long, slender sandbags of any desired weight, which are made of durable fabric and provided with rope handles at either end. On the sides are loops of webbing into which the feet can be inserted for leg exercises. Besides serving the purpose of several types of exercisers, it is pointed out that the sandbags are preferable to Indian clubs and dumb-bells in that they can be used noiselessly.



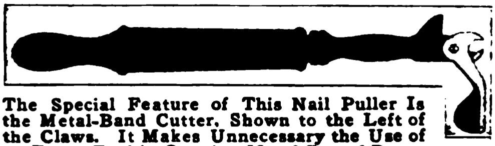
JAPANESE SWORD PRESENTED TO PRESIDENT

As a token of respect and good will the Japanese government has presented President Wilson with an antique Nipponese sword. The ancient weapon, quaintly ornamented, is one of a number of historical swords selected as gifts for President Wilson, King George, King Albert, President

Poincaré, and King Emmanuel. The presentation was made in October at the White House by one of Japan's foremost editors on an official visit at Washington.

IMPROVED NAIL PULLER HAS BOX-STRAP CUTTER

A nail puller for opening boxes and crates has been improved by the addition of a metal-band cutter which projects from the side just above the claws at the lower end. Because of the low grade of lumber now much used in box making, strap iron is used as reinforcing much more than formerly, and the cutting member referred to is a great aid in opening boxed or crated shipments.



The Special Feature of This Nail Puller Is the Metal-Band Cutter, Shown to the Left of the Claws. It Makes Unnecessary the Use of an Extra Tool in Opening Metal-Bound Boxes

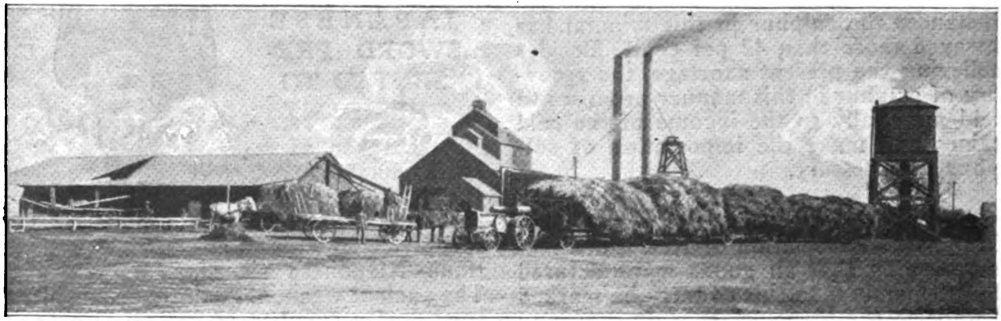
MILL'S TRACTOR HAULS LOADS FOR SEVERAL FARMERS

In southwestern Colorado, where alfalfa is grown in large quantities and shipped to mills which use it in preparing an alfalfa meal for commercial purposes, a new plan of doing hauling with tractors has been developed. When a farmer has a load of alfalfa ready to be made into meal, he hauls it to the nearest road or lane, leaves it there, and notifies the mill. When four or five loads are ready in the same neighborhood, a tractor is sent out which picks up the loads one at a time, forming a train that is hauled to the mill with far less labor than if each farmer hauled his own.

BIG REDUCTION IN ACCIDENTS AT WESTERN SHIPYARDS

Adoption of an interesting safety-first system in the steel shipyards of the Pacific coast has decreased personal accidents 75 per cent and effected a 40-per-cent reduction in insurance rates. The plan virtually makes every workman an inspector. On each tier of scaffolds are blackboards. When an employe sees a loose bolt, a misplaced tool, a weak plank, or anything else that might subsequently cause the injury of some fellow workman, he writes a memorandum of it on the nearest blackboard. It then comes to the attention of a safety-first man who investigates the condition and has it remedied immediately. When an inspector finds a tool that has been left in a dangerous position, he marks it with a white cross, finds the workman who mislaid it and explains to him how the safety of his fellows has been jeopardized. Receptacles have been provided for extra bolts and rivets so that there is no excuse for leaving them where they might fall and strike some one below. When a workman climbs a tall ladder, his tools are hoisted for him so that his hands are left free. Lastly, the whole plan has the indorsement of the labor unions, and members who fail to follow its rules may be suspended.

ℭA pipe organ in Shanghai, China, which has long been an object of interest because it has pipes of bamboo, after having been in use 50 years, is about to undergo alterations. Metal pipes will be substituted for the bamboo. It is said that this instrument, while not in perfect tune, produces surprisingly sweet, soft notes. It is considered remarkable that the builders could have produced such fine results with such unsatisfactory material.

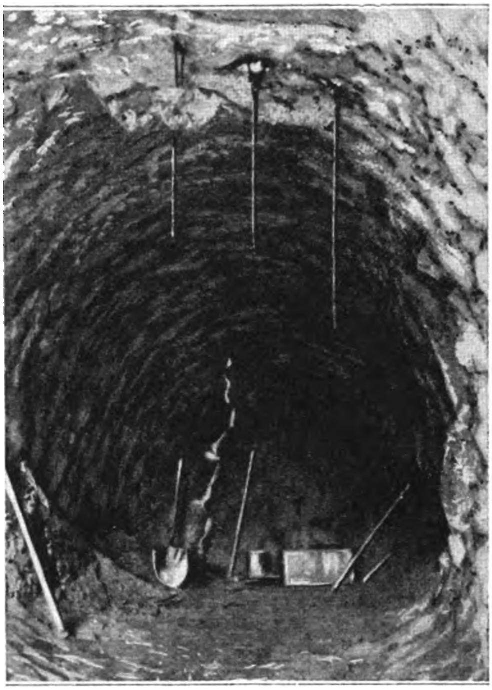


Tractor Train Composed of Several Loads of Alfalfa to be Made into Meal at the Mill: The Tractor is Furnished by the Mill and Makes Trips into Surrounding Country Periodically to Pick Up the Loads Which the Farmers Leave at the Roadside

MINING OIL FROM SAND REEFS

By O. J. GRIMES

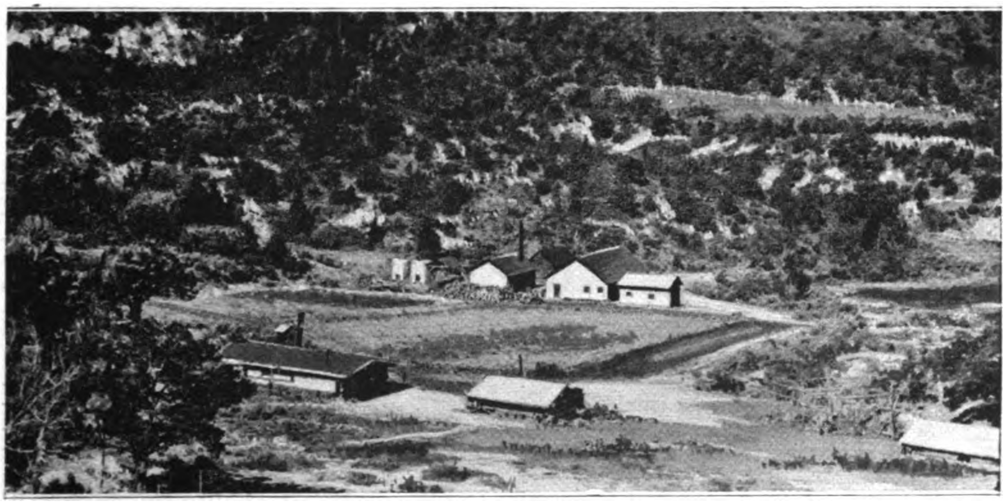
THE urgent appeal of the government for a greater production of petroleum to meet the demands of war has stimulated activity in all oil fields of the country, but probably in no other district have such unusual methods been employed to gain production as in the Uintah basin. This basin is situated partly in Utah and partly in Colorado, is isolated from the outside world in so far as transportation is concerned, and is the home of the remnants of the once powerful Ute Indian tribes.


Tunnel in the Side of a Mountain So Saturated with Oil That It Drips from the Roof and Oozes from the Sides of the Bore

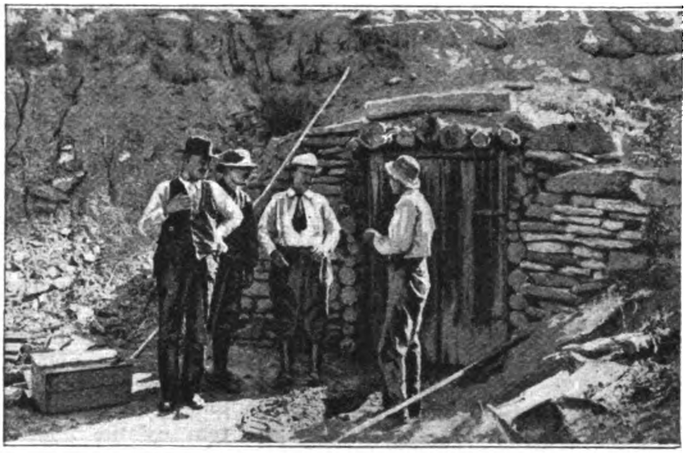
Men of Utah and Colorado are not wont to boast of any special training in the oil industry, but they are proud of the achievements of their states in the mining world, and it was no more than natural, probably, that they sought to obtain oil production by the application of mining methods—by driving tunnels instead of wells. The Uintah basin now can boast of two oil mines. One, situated near the headwaters of Whiskey Creek, in Colorado, a few miles from the Utah line, already is producing oil by the tunnel method. The other oil mine is near the Whiterocks Indian school, in Utah, and is rushing work as rapidly as possible to get on a producing basis.

In driving the tunnel to tap the oil sands in the Whiskey Creek country the owners of the property were guided to some extent by the knowledge gained in the driving of a well farther up on the mountain. Four strata of oil sands were penetrated. Then, too, there was an oil spring in a cañon on the property.

The original tunnel was driven into the mountain a distance of about 200 ft. before the better-producing sand was tapped. The oil flows from the sand into a


The Refinery in Whiskey Creek Cañon, Erected to Take Care of the Oil Which Flows from a Vein of Sand Tapped by a Tunnel: The Crude Oil is Conveyed by Gravity through a Pipe Line to This Plant

sump in the mine, from which it is pumped into a pipe line and conveyed by gravity to the little refinery erected at the base of the mountain. The average production from this tunnel is about 10 bbl. a day and the capacity of the refinery is about 30 bbl. of crude oil a day, but can be doubled with but little effort and expense. A second tunnel, lower down on the mountain, has been started and is now in about 150 ft., and a much heavier production has been obtained, which will furnish enough crude oil to work the refinery to capacity.



Mouth of the Tunnel in Which Oil is Collected in a Sump and Pumped into Pipes That Lead Down to the Refinery: The Average Production Is 10 Barrels per Day

The oil is as unusual as the method employed in procuring it. It is of an extremely heavy paraffin base and is without any of the lighter volatiles, such as gasoline and kerosene, making it adapted only to the production of the highest grades of lubricants.

The oil mine at Whiterocks is an entirely different proposition; it is a mountain of oil sands, forced upward in the upheavals which formed the Uintah Mountains, and no effort is being made to obtain production by flow. Short tunnels have been put into the mountain at different places to prove up the body of sand, just the same as miners prove up the ore bodies in a mine. That the sand is saturated with petroleum is indicated by the fact that oil seeps from the roof and sides, and oozes from the bottom of the tunnels steadily.

The Whiterocks enterprise includes the erection of a plant to extract the oil from the sands, or rather to wash the oil from the sands. A process has been devised and given exhaustive tests at the University of Utah and is to be employed in the Whiterocks plant. The sand is to be crushed, washed with gasoline and hot crude oil, and then run through a drying room where the remaining oil in the sand is vaporized and recovered by condensation. The oil thus recovered is the same as the crude obtained from wells except that some of the free gasoline has been taken off during the treatment. Tests made to date indicate that the sand mountain will yield from 25 to 30 gal. of crude oil to the ton of sand, and it is possible that the yield will increase, as the farther the mountain is penetrated, the more heavily charged the sands appear to be. The oil tests about 29.5° Baume, and analyses indicate that its base contains about 54 per cent paraffin and about 36 per cent asphaltum.

The mountain of sand which is to be mined is the same as the sands which are sought by drills throughout the country. In this instance, however, nature has brought the sands to the surface. While some loss may have been suffered by evaporation in the case of the lighter volatiles, still the greater part of the oil supply has been preserved by nature's own peculiar processes. When the hot summer days reduce the viscosity of the oil and it seeps to the surface it is immediately coated with fine dust and the pores of the sand exposed to the air are hermetically sealed.

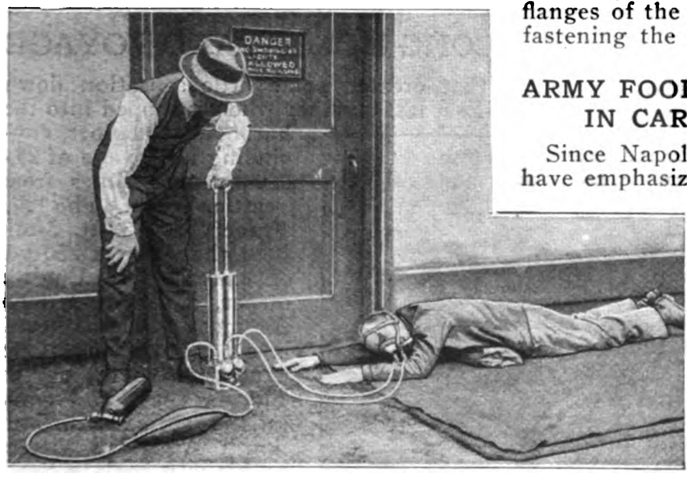
The West is especially fortunate in the matter of oil sands. Besides several big deposits in the Uintah basin, probably the largest deposit of saturated oil sands on the continent, if not in the world, which has been brought to the surface by nature, has been discovered in the San Rafael country, in southeastern Utah. The great oil-sand reefs are exposed there for many miles, but as yet very little has been done to develop this resource because of its isolation from the outside world. The region where the sands are situated is approximately 125 miles from a railroad, by the roads now in use, and is reached only by crossing a desert. However, interest in the proposition has been aroused recently; new highways are being constructed, water wells put down along the highways, and plans are being formulated for active development of the oil-sand deposits.

WORLD'S LARGEST HOTEL FOR SHIP WORKERS

To the "world's-largest" list, which has grown rapidly since the beginning of the great war, may now be added what is said to be the world's largest hotel. This institution was established in Philadelphia for the benefit of Hog Island ship workers and their friends, and contains 2,175 rooms, all of which have an outside exposure. The furnishings, while not elegant, are substantial and attractive. There are a number of recreation rooms in which are mission rockers, writing desks, and reading tables supplied with a variety of magazines. In each dining room are 60 tables, each seating eight persons. The linen, silverware, and glassware are of good quality, and a staff of experienced hotel men are in charge.

NEW OXYGEN APPARATUS FOR GAS VICTIMS

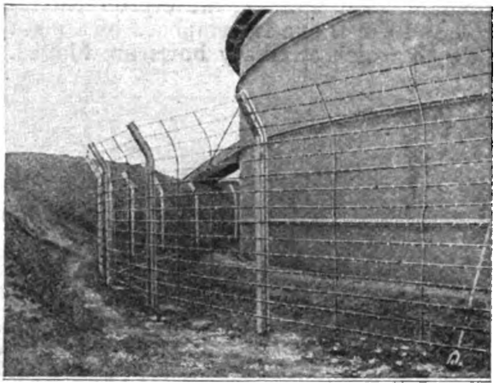
Since the invention of special apparatus for resuscitating persons overcome by gas, equipment of this sort has made possible so many remarkable rescues that its use has become widespread and improvements in design have been frequent. One of the latest outfits is shown herewith. A two-cylinder pump is employed in forcing pure oxygen, obtained from a small steel cylinder, through rubber tubes into the lungs of the victim, a mask being fastened over the face of the stricken person to insure the proper delivery of the oxygen into his system.



Reviving a Man Overcome by Gas: The Pump, Which Resembles an Automobile-Tire Pump, is Used in Supplying the Victim with Pure Oxygen Obtained from the Small Cylindrical Container on the Floor at the Left

HIGH BARB-WIRE FENCE HAS STEEL RAILS FOR POSTS

A barb-wire fence so strong that it would check the progress of a fighting tank, were one to attempt to push through it, has been erected about a large reservoir of a western water company. The fence is 10 ft. high, and railroad rails set in concrete bases serve as posts. These are bent outward at an angle at the top. Fifteen strands of barb wire are fastened to the posts, holes being drilled in the flanges of the latter to provide means for fastening the wires in place.



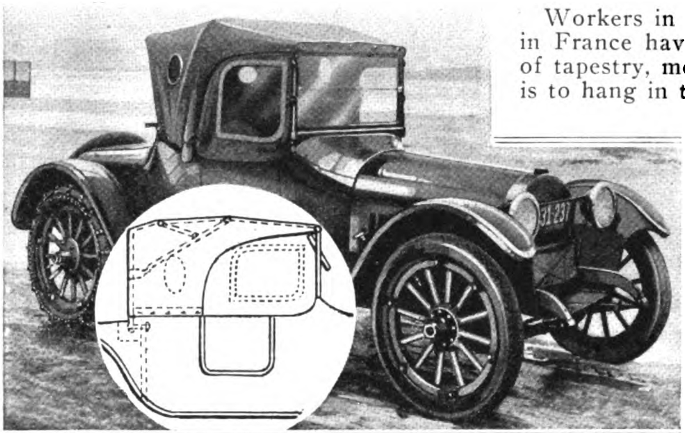
Fifteen-Strand Barb-Wire Fence, with Steel Rails for Posts, Erected about a Reservoir of a Western Water Company

ARMY FOOD HERE AND ABROAD IN CARE OF SCIENTISTS

Since Napoleon's time military experts have emphasized the importance of keeping an army well fed, but in the present war, rationing has been reduced to a science. In the American army, the surgeon-general's office has what is known as the Nutrition Section, which determines the nutritive quality of army rations and devises means for preserving army food scientifically. Several of these officers are assigned to the camps in this country, while 29 have recently been sent abroad to undertake similar work. Being familiar with Americans' tastes, it is often possible for them to suggest changes that add to the attractiveness of the rations, while at the same time proper balance in food values is maintained.

REMOVABLE MOTOR-CAR TOP FOLDS UP COMPACTLY

An automobile top has been devised which can be quickly removed and folded into small space for carrying. It is covered with suitable waterproof material and the frame is composed of a main bow to which auxiliary bows are hinged. Straps extending from the frame to the windshield help support the covering. Each bow is composed of overlapping parts, making it adjustable to the desired size, and is also hinged in at least two places, in order that it may be folded compactly.

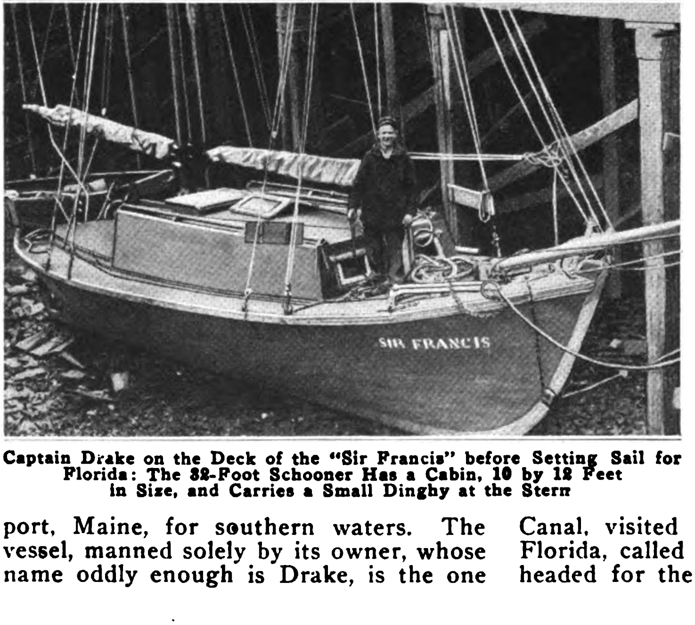


Automobile Equipped with a New Removable Top of Simple Construction Which can Easily be Folded into Small Space for Storage under the Seat, or Elsewhere

FRANCE GIVES TAPESTRY TO PHILADELPHIA

Workers in the famous Gobelin factory in France have begun fashioning a piece of tapestry, measuring 15 by 21 ft., which is to hang in the museum in Philadelphia—a gift from France to the Quaker City. The prized fabric will depict with color and animation the departure of American troops from Philadelphia for Europe. Three panels will contain these phrases from President Wilson's messages: "Right is more precious than peace," "We have no selfish end to serve and desire no conquest and no domination," and "We shall fight for democracy."

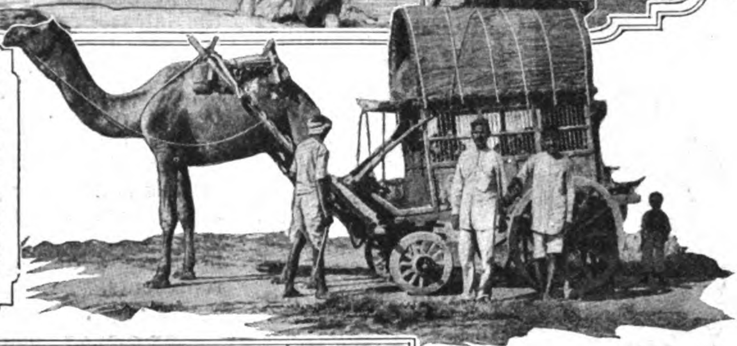
ROVING SCHOONER STARTS LONG HOMEWARD VOYAGE



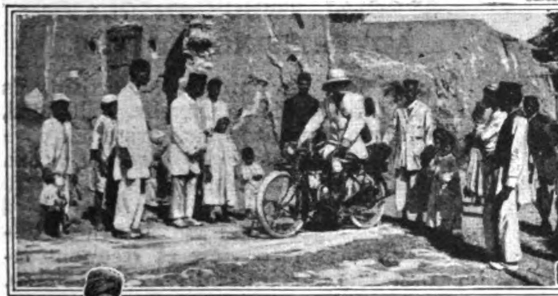
Captain Drake on the Deck of the "Sir Francis" before Setting Sail for Florida: The 32-Foot Schooner Has a Cabin, 10 by 12 Feet in Size, and Carries a Small Dinghy at the Stern

In mid-October the two-mast auxiliary schooner "Sir Francis" put out from Eastport, Maine, for southern waters. The vessel, manned solely by its owner, whose name oddly enough is Drake, is the one that created some little sensation down East last summer when it slipped into the harbor at Eastport, concluding its voyage of 25,000 or more miles from Seattle, Wash. The "Sir Francis" is a 32-ft., 5-ton boat that carries 750 yd. of canvas. Its English owner, a seafaring man for most of his 55 years, is out sight-seeing. He expects to winter on the Florida coast and early in the spring sail into South American waters on his way back to Seattle via the Horn. He left the latter port for the east coast July 28, 1915. After visiting many ports from Washington to Central America, he went through the Panama Canal, visited the West Indies, touched Florida, called at the Bahamas, and then headed for the Maine coast.

SOME TRAVELS OF MISSIONARIES IN INDIA



Although the Picture Above Looks Not Unlike Some Rural Barnyard Scene, It Shows a Native Circuit Rider Entering a Village on His "Preacher" Pony. The Photograph at the Side Shows Native Religious Workers on Their Way to a District Conference via Camel Wagon. Luggage is Borne in the Upper Compartment



The Scene Above Is Perhaps Not So Picturesque as the One at the Top of the Page, but This Circuit Rider Preferred a Motorcycle to a "Preacher" Pony

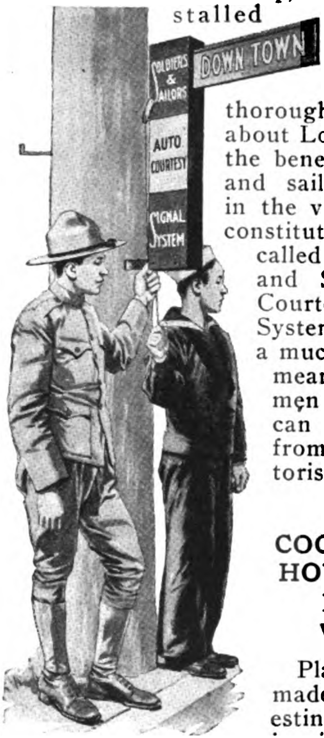
The Pushcart Bears Not Spices of the East, but 30,000 Copies of Religious Tracts, Texts, and Similar Printed Matter for a Missionary

The Missionary's Motorcycle in the Care of Admiring Natives on a Bank of the Ganges, One of the Points Visited during a 400-Mile Overland Trip

In the Interior of India a Motor Car Is Not So Commonplace as in New York or Chicago and Therefore Is an Object of Great Wonder and Admiration among Villagers

SOLDIERS SIGNAL AUTOISTS WITH NEW SEMAPHORES

Semaphores having several arms bearing such inscriptions as "Down Town," "To Camp," are being installed by a public-spirited business organization on thoroughfares in and about Los Angeles for the benefit of soldiers and sailors stationed in the vicinity. They constitute what is called the "Soldiers' and Sailors' Auto Courtesy Signal System" and afford a much appreciated means by which men in uniform can ask for a lift from passing motorists.



One of the Semaphores Erected in and around Los Angeles with Which Soldiers and Sailors can Ask Passing Autoists for a Lift: Different Arms Indicate Different Destinations

COOPERATIVE HOUSING FOR DANISH WOMEN

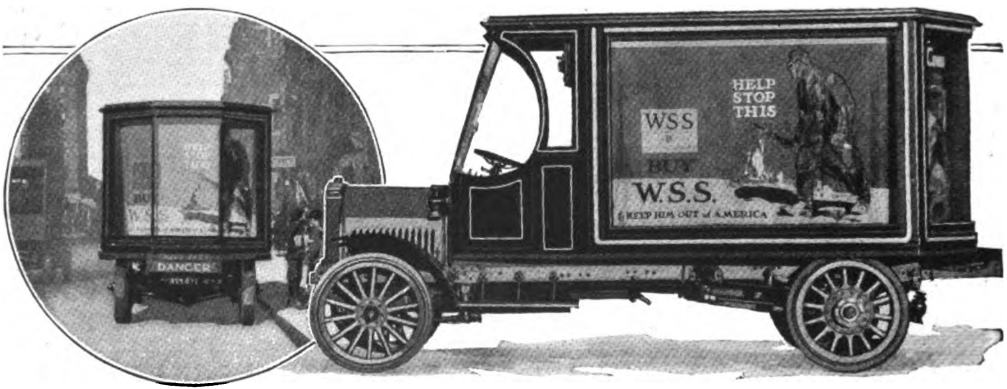
Plans are being made for an interesting undertaking in coöperative housing for women, in Copenhagen. It is proposed to erect a large house containing 135 separate rooms, five two-room apartments, and 10 studios for artists—all of these to be placed at the disposal of women earning their own living. Each resident would own a share in the undertaking, according to the plan, and would have access to the common dining room or could have meals delivered to her apartment by means of a lift.

MEDALS IDENTIFY MEMBERS OF FRENCH PARLIAMENT

The designs of medals for members of the latest French parliament which have recently been made public call attention to an interesting practice by that legislative body. It appears that each member is presented with a medal which serves both as an identifying piece and as a souvenir. On one face of these new medals is a striking medallion of a female figure representing France and on the other side is engraved the name of the holder and of the department which he represents.

SPECIAL TRUCK DISPLAYS ADVERTISING POSTERS

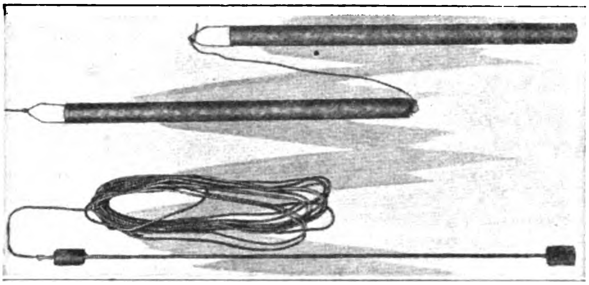
A new idea in outdoor advertising is what might be called a traveling billboard, consisting of an auto truck provided with a body having glass sides through which changing posters, displayed within, can be seen. The advertisements are mounted on a revolving curtain which brings different displays into view at frequent intervals. The curtain is driven by a ¼-hp. motor connected with storage batteries which also supply current to lamps that illuminate the posters at night. The unusual character of the truck and the fact that the posters revolve, naturally attract much attention to the advertisements.



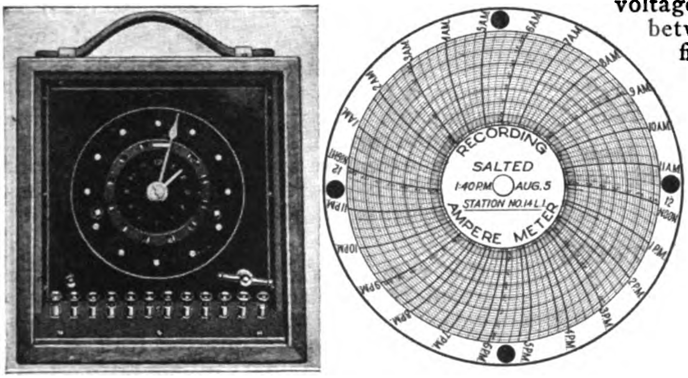
Auto Truck Equipped to Serve as a Traveling Billboard: The Poster Shown Here Is One of Several Mounted on a Revolving Curtain

MEASURING WATER RESOURCES ELECTRICALLY

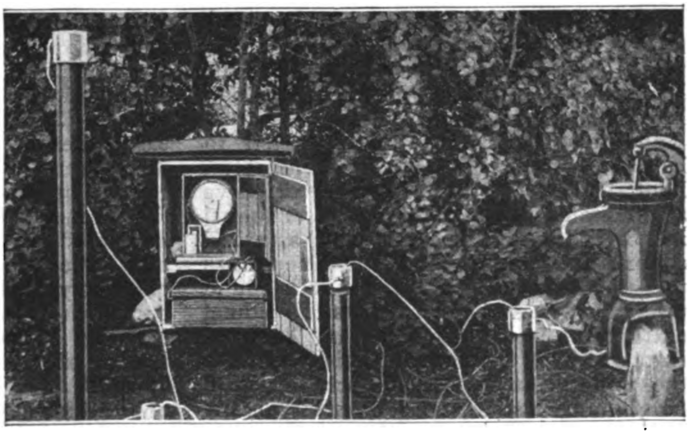
More or less interest is attached to a method lately demonstrated by the United States Geological Survey for measuring the flow of an underground watercourse. The plan is worthy of notice because of its practical value, rather than on account of any new discoveries it involves. Essentially it consists of the application of known electrical principles and the use of simple apparatus. The advantage of the scheme is that it enables a fairly accurate estimate to be made of the potential capacities of wells before they are actually established and expensive machinery installed, thus obviating guesswork and the likelihood of very costly disappointment.


The Perforated Tubular Buckets in Which the Electrolyte is Placed are Shown at the Top, While Below, with Wire Connected, Is One of the Four-Foot Electrodes

Two or more test wells are driven close together in line in a place known to possess water resources. Electric connections are made with the well casings. The downstream bore is fitted with an electrode four feet long and insulated from the tubing by means of wooden spools. An insulated wire connected with it communicates with the surface. An electrolyte, such as sal ammoniac, is placed in the upstream, or No. 1, well. As it is absorbed by the water and carried downstream, an excellent conductive medium is gradually established so that the current flow between the wells rises.



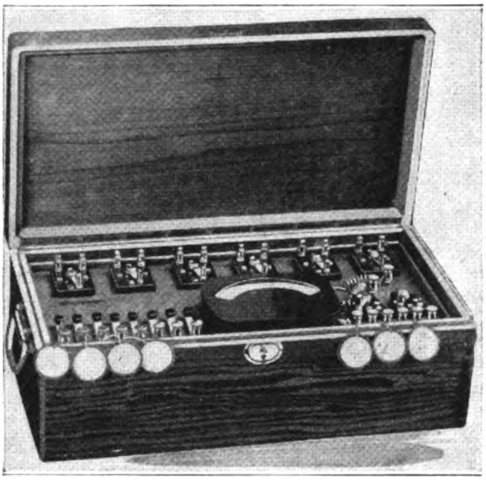
Left: The Commutator Clock is Set to Make an Electric Contact Every Five Seconds and, When Used in Connection with the Recording Ammeter, Obviates the Necessity of Personal Supervision of the Tests. Right: One of the Disk-Shaped Charts on Which the Ammeter Readings are Automatically Recorded by a Stylus


The Cabinet in the Background Holds a Recording Ammeter, a Commutator Clock, and the Batteries. In the Foreground Are Test Wells

When the electrolyte in its maximum strength reaches the lower well, or wells, a short circuit is effected between the casing and the internal electrode of the latter, thereby causing an abrupt rise in voltage. The time that elapses between the charging of the first well and the arrival of the electrolyte at the lower one, indicates the velocity of the water current. This, obviously, forms a basis for other calculations.

By employing a recording ammeter and a commutator clock, a series of wells may be tested and the readings registered automatically. Otherwise it is necessary for operators to be in attendance throughout the whole course of the observations.

One plan, however, gives as accurate results as the other. The only difference is the convenience of the automatic-recording outfit as contrasted with the comparative cheapness of the direct-reading apparatus. The scheme has been employed successfully both in this country and Canada.


The Direct-Reading Apparatus, Here Shown, Requires the Presence of an Operator Once Every Hour during the Course of the Tests

WAR AWAKENS INDUSTRIES IN INDIA

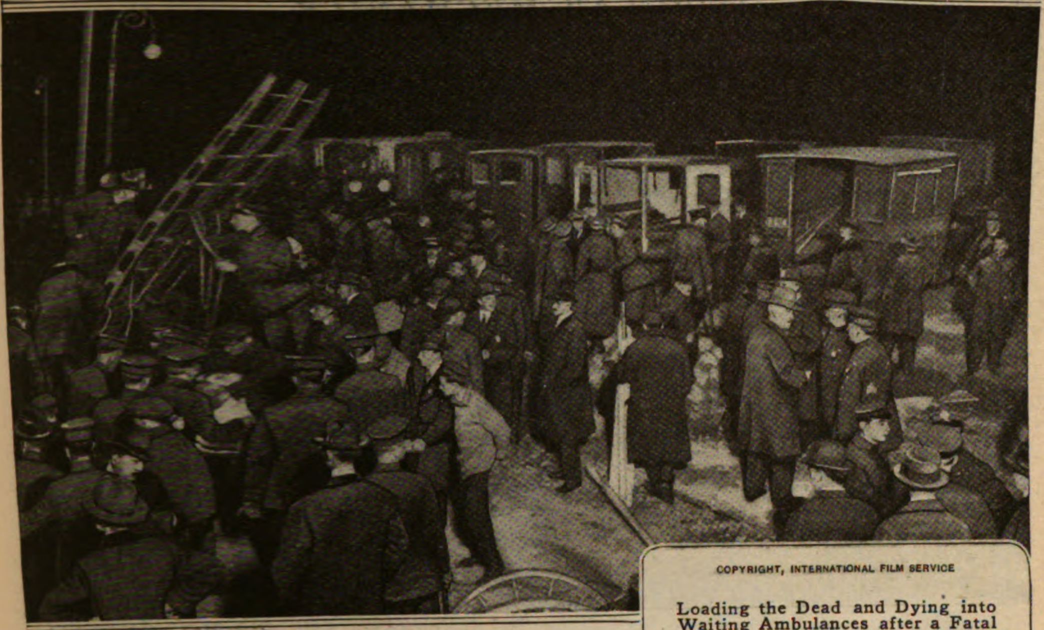
One of the countries to experience a great industrial awakening during the war is India, which suddenly found itself thrown on its own resources for many things formerly imported, and confronted with the task of sending supplies to British armies. Marked progress is being made in tanning, vegetable tanning materials being supplanted in many places by chromium compounds such as American tanners use. Before the war there were 60 jute mills, while in 1918 the number had increased to 74, and the export of gunny sacks had more than doubled. Similar activity was present in cotton weaving and is destined to continue. Production rose by more than 500,000,000 yd., or nearly 50 per cent above the pre-war average.

In the matter of electrical development India has been exceedingly slow. This is illustrated by the fact that there are only a few miles of single-track electric road in the country. Nevertheless there are many projects for greater use of electricity under consideration. These include power plants in spinning mills, and greater use of electric fans and electric lights. Thirty-four mills in Bombay are now under contract to use electric power from a certain large hydroelectric-power company. The war has brought about the manufacture of shells, rivets, nuts, etc., on an extensive scale. Keeping pace with all this development are proposed improvements in the banking facilities.

¶A new form in which foodstuffs are about to be placed on the market by a concern in the state of Washington consists of bricks of compressed fruit or vegetables. It is said that laboratory tests have proven that food put up in this way retains its flavor and food properties and can be shipped to any part of the world.

SCORES KILLED IN BROOKLYN RAPID TRANSIT WRECK

Eighty-nine passengers were killed and more than 100 others injured recently when a crowded five-car train on the Brighton Beach line of the Brooklyn Rapid Transit Company was wrecked. Running at terrific speed, reported to have been as great as 60 or 70 miles an hour, the train left the track on a curve at the mouth of the Melbone Street tunnel in Brooklyn. The lead car smashed against the concrete wall that separates the north-bound from the south-bound tracks and was thrown across the tunnel entrance. The following cars battered through it and smashed their way into the underground passage, scraping and lunging against a series of steel pillars. The passengers jammed in the first car were slaughtered. Many of those in the second and third cars who escaped death were imprisoned beneath a mass of wreckage. Persons in the last two cars met with good fortune, for, although shaken, their escape was comparatively easy. Rescue work was long delayed for unapparent reasons. Fully a half hour elapsed before police and firemen reached the scene. Their work was seriously hampered because the wreckage practically sealed the tunnel and made access extremely difficult. The derailment occurred shortly before seven o'clock in the evening, but it was midnight before the bodies of all of the dead had been recovered. The tragedy crowned the events of the first day of a strike called by local trainmen. Piloting the ill-fated express was a substitute motorman.



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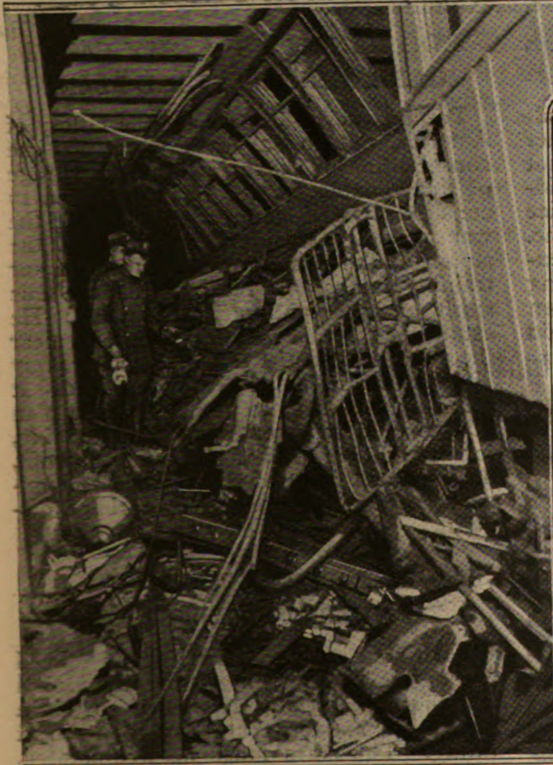
Loading the Dead and Dying into Waiting Ambulances after a Fatal Wreck on the Brighton Beach Branch of the Brooklyn Rapid Transit Lines Recently



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Searching for Victims Amid the Débris: The Wreck Occurred When a Five-Car Train Jumped the Track and Crashed against the Walls of the Melbone Street Tunnel in Brooklyn, near Prospect Park

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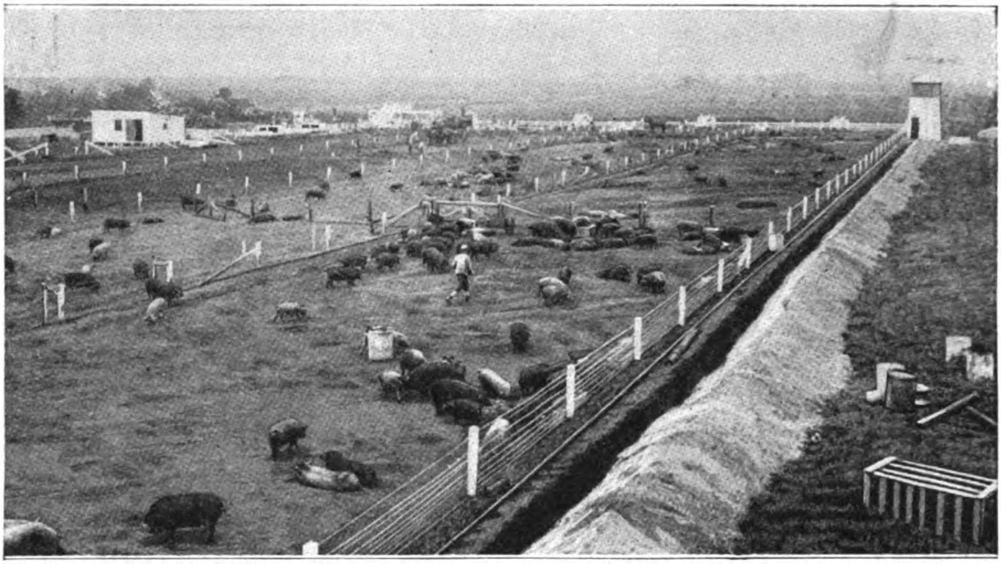
Gathering the Clothing and Personal Effects of the Victims After the Latter had been Removed: Eighty-Nine Persons were Killed and More Than 100 Others Injured



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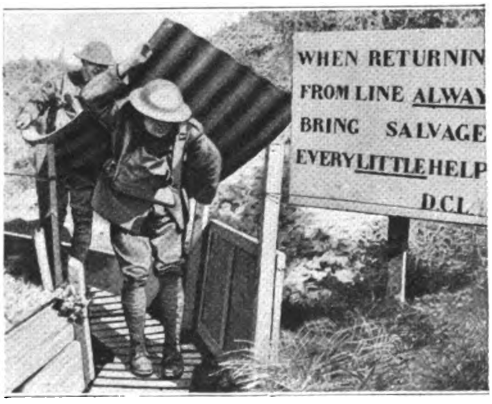
View of the Hog Farm Established near One of Our Army Camps for the Utilization of Garbage and Waste from the Kitchens

SOLDIERS LUG HEAVY SALVAGE REARWARD FROM LINES

As might be imagined, the task of salvaging the waste war materials that litter the battle fields is an immense one that entails much effort. It is being considerably facilitated, however, by a practice that has been in force for some time. Orders have been issued and conspicuous signs erected at the front directing men to bring salvage with them when returning from the lines. And they do so. All of which goes to show that those of us who stay at home have no patent on the war-time slogan, "Save."



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A Heavy Piece of Salvage, Apparently a Sheet of Corrugated Iron, being Carried Rearward by Two Tommies Returning from the Lines

HOG RANCH IS ARMY CAMP'S GARBAGE-DISPOSAL PLANT

Perhaps never before in the history of America, not to say the world, has the conservation of material, and the salvage of unavoidable waste, been practiced so consistently and generally as during the war period. Consider, for instance, the action of the commandant of one of our training camps who realized that the true spirit of conservation is utilization. He established a well-planned hog farm near the camp so that the waste from the army kitchens might be profitably utilized. It is hardly necessary to mention that a plan of this kind represents a twofold saving, for in addition to changing loss to profit, it eliminates most of the trouble and expense otherwise involved in garbage disposal.

STARS IN SHIPYARDS' FLAGS TO NUMBER LAUNCHINGS

Each time a shipyard flying an official flag of the United States Shipping Board launches a vessel, it is entitled to add a star to its banner, according to a recent ruling. The stars must be five-pointed, of red bunting, and one-half the size of the lettering used in the words "U. S. Shipping Board." The manner in which the stars are to be arranged is also specified. The addition of stars is left entirely optional with each yard.

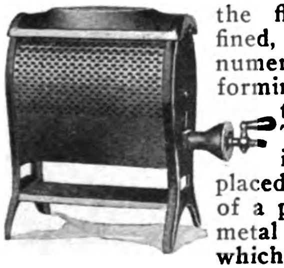
DESERT HIGHWAYS GLEANED FOR RED CROSS JUNK

The Los Angeles chapter of the Red Cross recently carried out a most profitable idea in the form of a junk-salvaging expedition along the motor highways of the Mojave Desert. Motorists have been making use of these roads for years, and because of their exceedingly rough nature, they are unusually hard on tires. Bumpy roads and desert heat are conducive to blow-outs, and as a result the desert became strewn with old casings and tubes that were past redemption by means of repair. Then came the shortage of rubber with the resultant high market price paid for old rubber in any form.

Taking advantage of these conditions, the local chapter of the Red Cross sent two patriotic citizens, who donated their services and the use of a motor truck, into the desert. Going east over the Santa Fe Motor Trail they picked up 127 old tires in the 305 miles between Los Angeles and Needles. They also picked up 1,321 beer bottles and nearly half a ton of old motor parts that had been abandoned along the highway. By arrangement with the Santa Fe Railway, all of this junk was loaded into a box car at Needles and shipped to Los Angeles free of charge. The truck then returned to the city via Yuma and the Borderland Trail, gathering up 176 more tires, 1,200 bottles, two wrecked automobiles, and a capacity load of miscellaneous salable junk. The proceeds of the expedition turned nearly a thousand dollars into the till of the Red Cross.

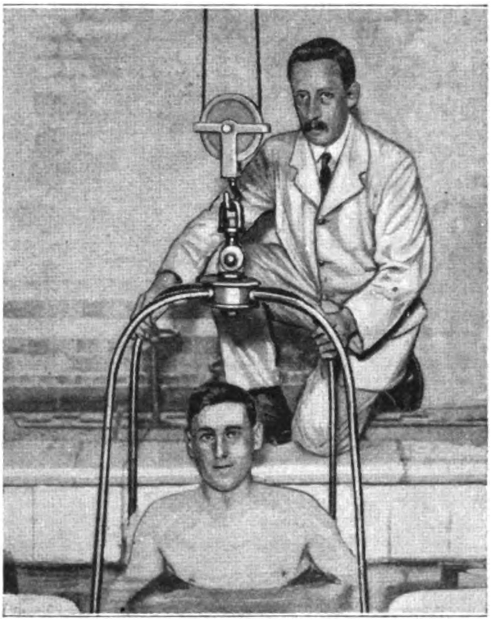
EFFICIENT GAS HEATER HAS SAFETY FEATURES

A gas heater for which exceptional heating powers are claimed has a perforated cast-iron core in which the flames are confined, the burner with numerous raised tips forming the base of the hollow core. This whole heating element is placed in the center of a perforated sheet-metal guard, through which heat radiates when the core becomes red-hot. A draft will not blow out the flames, it is said, and articles cannot come in contact with them.



INVALID SOLDIERS TREATED IN CHAIR HOISTS AT BATH

Many sick and wounded soldiers are sent to Bath, the English health resort in Somersetshire, renowned for centuries because of the curative properties of its mineral springs. To facilitate the treatment of those who are very weak or badly crippled, and therefore difficult to handle, a chair hoist, which enables a patient to be lowered into the water and withdrawn from it readily, is employed. It will be recalled that the origin of Bath antedates the birth of Christ by 863 years, and that the value of the waters there was later recognized by the Romans during their period of occupation. Traces of radium have been found in the springs, and the gases are said to contain argon and helium.



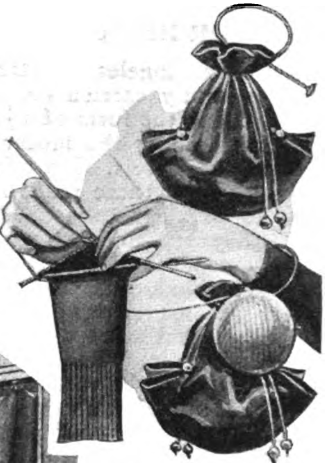
Chair Hoist Used to Facilitate Handling Invalid Soldiers under Treatment at Bath, the Famed English Health Resort in Somersetshire

A saving of unnecessary consumption amounting to 15 cents a day by one hundred million Americans would mean a saving of $5,475,000,000 a year. A saving of 15 cents a day per family would mean roughly one billion dollars a year. The Thrift and War Savings stamps give us the facilities for transferring these little savings to the government without inconvenience or trouble.

SOME NOVEL AND LITTLE-KNOWN ACCESSORIES

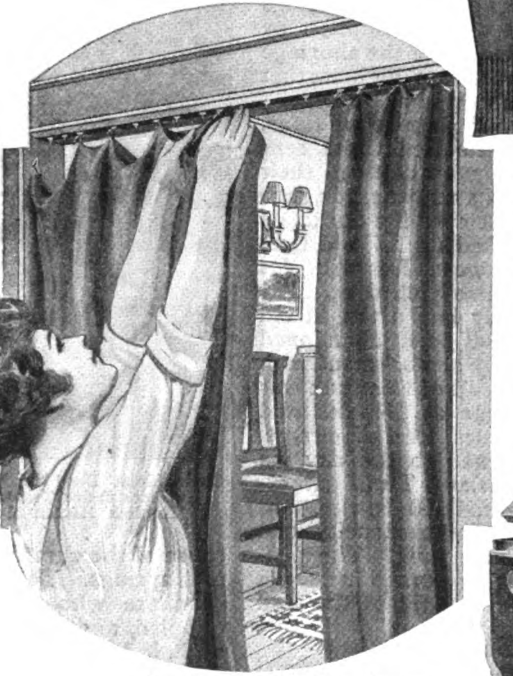
Here Is a Convenient as Well as Novel Yarn Winder. It Opens Like an Umbrella and Adjusts Itself to a Skein of Any Size

White-Rubber Drinking Cup Supplied with a Flat Khaki-Colored Case: A Serviceable Article for the Soldier, Outer, and Traveler



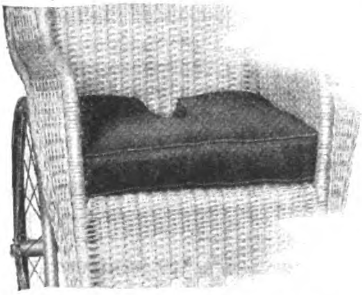
Those Who Knit While Motoring and Commuting will Appreciate the Attractiveness of This Black Satin Bag with Its Silver Bracelet and Yarn Holder

Those Who Work at Paper-Littered Desks and Use Fountain Pens Many Times Daily will See the Good Features of This Upright Holder

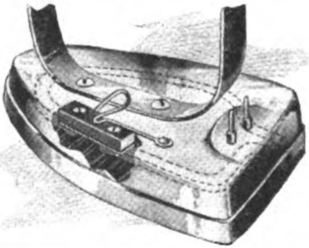


New Type of Portière Hanger Consisting of Grooved Strip in Which Wooden Balls, with Suspended Pins Attached, Are Free to Slide: The Arrangement Eliminates the Old-Fashioned Pole

Especially Designed for Soldiers and Sailors Is the Tobacco Pouch Illustrated Above. It Is Waterproof and Dustproof and Has Compartments in the Top for a Box of Matches and a Package of Cigarette Papers. The Bag Is Available Both in Khaki and Navy Blue

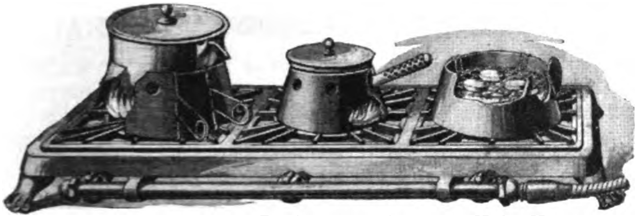


The Invalid's Cushion Here Shown is Made of Layers of Felt and Springs. The Cut-**Away Portion Relieves Pressure on the Spine**

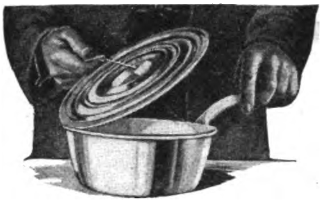


The Block-Shaped Device in the Cut-Away Section Is a Fusible Controlling Bridge Which Prevents the Flatiron from Overheating. If the Coil Radiates Excessive Heat, the Controller Melts and Shuts Off the Current

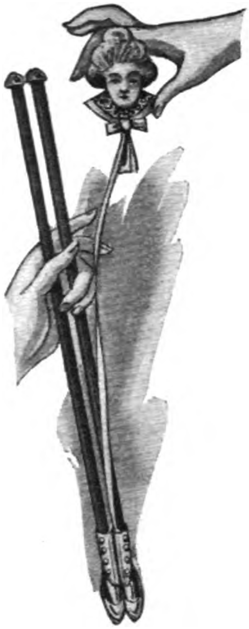
INTENDED FOR THE HOME AND ITS MEMBERS



This Gas-Conserving Device is Designed to Hold Heat around the Sides of a Cooking Receptacle and Prevent Needless Waste. It is Claimed, for Instance, That by Using the Contrivance, 2 1/16 Cubic Feet of Gas are Saved in Heating a Gallon of Water to the Boiling Point

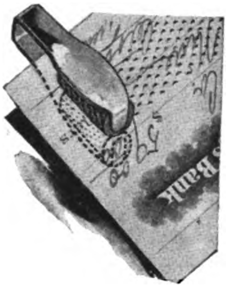


As This Cover is Raised, It Tilts to One Side, Draining into the Vessel, and Then Turns Completely Over So That When Laid on a Table Its Moist Side Is Up

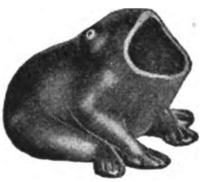


Distinctive Holder for Knitting Needles: An Elastic Cord Connects the Shoes and the Headpiece

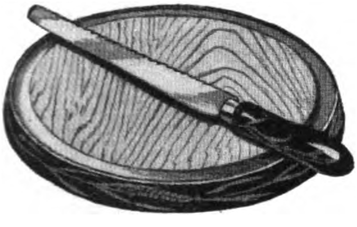
For Purifying and Filtering Drinking Water, This Electric Apparatus is Said to be Proficient. The Water is Chlorinated, but without Leaving a Chlorine Taste or Odor. The Receptacle Is of Two-Gallon Capacity and Operates at Nominal Cost



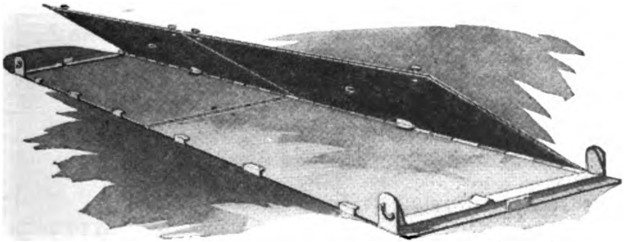
Pocket-Size Check Protector with Rollers Placed Longitudinally, Enabling Full Length of Check to be Perforated in One Operation



One of the Good Features of This Novel Ash Tray Is That Its Contents Are Not Liable to be Scattered by a Draft of Air

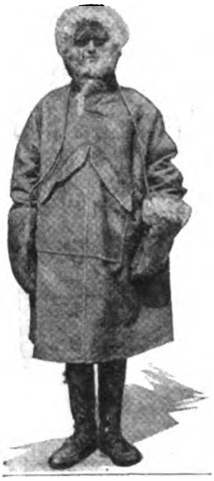


The Painted Decorations on This War-Time Bread Board and the Knife Are, Quite Ironically, of Golden-Colored Wheat



This Collapsible Trouser-Pressing Frame Occupies Little Space in a Trunk and is Intended to Enable a Traveler, or Other Person, to Keep Such Garments in Good Condition without the Services of a Tailor. The Pressing is Accomplished by Pressure, and No Heat is Required

WINTER WEAR FOR AMERICAN SOLDIERS IN SIBERIA



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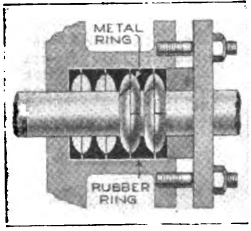
In addition to their regular heavy overseas equipment, the American soldiers now in Siberia have been given special outfits of clothing which make them look like explorers bound for the north pole. Each outfit includes a cap of muskrat fur, costing $12, and a coat of heavy moleskin cloth lined with fur and having enormous pockets. The shoes are made of cowhide like Canadian moccasins, and are worn with heavy lumberman's socks, while the fur gauntlet mittens are lined with blanket cloth and cost $16.50 a pair. Like children's mittens they are connected with a stout cord, which prevents their being lost when removed for shooting.

METALLIC PACKING IS HELD BY RUBBER RINGS

Interesting claims are made for a metallic packing that is composed of a series of frictionless babbitt and composition-rubber rings. The former members are segmented and held together by a light copper wire. This leaves a small space between each of the sections so that provision is made for wear. Also, the metal rings are made flat on one side and rounded on the other. The flat sides are placed together. The rubber rings are tapered on the inside so as to fit the metal ones snugly. Slight pressure upon the glands causes the rubber rings to force the metallic ones firmly against a rod or piston. The rubber, however, does not come in contact with the latter. The packing is made to fit any stuffing box and is claimed to serve for long periods without leaking or requiring any attention whatever.

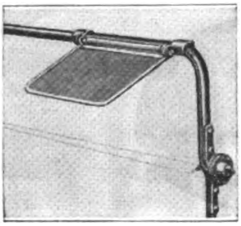


VAST HARBOR IMPROVEMENTS PLANNED FOR SHANGHAI

A body appointed to make an exhaustive study of the best means of enlarging the harbor facilities of Shanghai, China, has recently reported, recommending that $40,000,000 to $45,000,000 be spent in making the Whangpoo River into a lake, the shores of which will be one continuous line of docks. Emphasis is laid on the fact that China is destined to share increasingly in international commerce after the war. To meet the new demands, there must be harbor facilities sufficient to accommodate the largest boats that will come through the Panama Canal. It is pointed out that if some one port in China does not make adequate provision for the great ships from America and Europe, a Japanese port will undoubtedly be made the terminal for the bulk of the transpacific traffic, and only second-rate vessels would come to China.

In urging the making of the artificial lake and other improvements involved in the change, including the building of quays along some 38 miles of shore, attention is called to Hamburg, Germany, and the expenditures made there to provide a world harbor. It is said that a whole district of the German town, with 1,000 houses inhabited by 24,000 persons, was sacrificed in order that the harbor improvements might be made. It is maintained that Shanghai's advantageous position as compared with other Chinese harbors, and its location at the mouth of the great Yangtse River, make it the logical port for the vast improvements described.

STORM AND GLARE SCREEN MADE FOR WINDSHIELD OF CAR



Among the late accessories for the motor car, there is a combination storm and glare shield that is designed to be clamped to the outside of the windshield immediately in front of the driver's seat. It forms an awninglike protection of orange-colored celluloid that screens a small part of the shield from rain and sleet in stormy weather, and diffuses the direct rays of the sun, or of the headlights of approaching cars, at other times.

WOOD WASTE AND GOLD DOLLARS

Expert Teaches New Ideas in Wood Utilization and Cuts Manufacturers' Wood Bill in Half

By WILLIAM FLEMING FRENCH

OUT here on the west coast, if you mention wood you're almost sure to learn of Sackett. Somehow or other he seems to be correlated with timber, logging, and the like. Even up in the heart of the spruce country, where the government is pulling out millions of dollars' worth of airplane wood a month and where every thought is of war, I ran into an anecdote of this busy woodman.

The foreman of a spruce-felling camp told it to me.

"What do I know of Sackett?" he answered. "Well, one thing, anyhow. It was out in the California redwoods, about ten years ago, that I first saw him. He blew into camp one day; an inquisitive snip of a kid with a curiosity lump as big as a puff ball. Back in civilization you wouldn't notice him in a thousand years, but out here in his lumberjack outfit he'd open your eyes for sure. He snooped around our camps for a couple of days and then dropped into headquarters right in the middle of the fireworks. Some simpleton had fouled our booming crane and the whole thing had gone over into the float. Our superintendent was Irish and literally boiled over.

"Slap! Down went a neat white card. I caught the name Sackett, with about half the alphabet tacked on behind."

"That didn't faze the mild-mannered Sackett in the least, though. He edged through us to the superintendent, and then let drive at him.

"'Do you know your men are burning hundreds of acres of fine white-oak timber?' he demanded.

"There he was shown hundreds of thousands of acres of cut-over land . . . covered with pine stumps."

"'Who'n 'ell er you?' Murphy wasn't feeling like answering damn-fool questions about then.

"Slap! Down went a neat little white card. I caught the name Sackett, with about half the alphabet tacked on behind. And way down in the left-hand corner was something about the U. S. Forest Service.

"Murphy was still sore, but he changed his tune after he drank in that card.

"He succeeded in getting the mine operators to use fire-killed timber in their mines."

"'We burn all fallen timber and undergrowth preparatory to taking out the redwood. The redwood won't burn, you know.'

"'And how about all the fine white oak that has been felled?'

"Murphy grunted, and gave a snort.

"'Huh; that's no good. We don't use white oak for anything but its bark. Tan-bark oak, we call it. The bark's all been peeled from that stuff—so those old logs are worthless.'

"Well; that little fellow just laughed, right in the face of our fire-eating boss. Then he came back at him, kind of pityinglike.

"'That's your guess, Mr. Murphy. You people here on the coast are importing white oak from Japan and then telling us it's worthless except for its bark. I've an idea on this subject myself, however, and intend to stop the burning of this wood—if I have to get out an injunction against every logging outfit in the woods.'"

The big foreman grinned reflectively for an instant, then added:

"We quit burning peeled white oak that season. You know the rest of the story."

I did, for Sackett's work is now known throughout the whole country.

Immediately following his investigations regarding the burning of white oak, Sackett started a campaign of education among the lumbermen of the coast, and taught them something of the value of the wood that they had so long despised.

As a result of his work millions of dollars' worth of white oak is now being used on the west coast, especially in California, in the manufacture of furniture and wagons, and for cooperage stock and the like. As a matter of fact, the value of this wood for such purposes now greatly exceeds the value of the bark that is taken from it.

H. S. Sackett is a wood-utilization expert to whom wood waste is a personal injury, and for years he has fought this great American evil. In fact, he has solved so many problems in waste-wood utilization that he is convinced that there is a use for even the tiniest sliver—and he'll undertake to find that use, too.

So, just before the start of the big war, he was invited down to look over the pine lands of Louisiana, and the South generally. There he was shown hundreds of thousands of acres of cut-over land; land that was covered with pine stumps and considered practically worthless on account of the cost of clearing it.

Here was a chance to demonstrate his ability in utilizing waste wood. Find a use and a market for these stumps and he would have the everlasting gratitude of the South.

That looked like a real job to him, so he buckled in, and within a few weeks was heading a campaign to make turpentine, tar, pine oil, flotation oil, and charcoal from yellow-pine stumps. At Slidell, La., he built a plant and demonstrated to the lumbermen that more money could be made from an acre of pine stumps than they were in the habit of making from an acre of choice timber.

But perhaps this man is best known for his work as Chief of the U. S. Office of Wood Utilization, for as such he developed and prepared the now famous series of studies and reports on "Wood Using Industries of the United States"—the results of which have changed the whole trend of American wood uses. He was also well known as Chief of the Section of Lumber Trade, and later as Chief of Wood Utilization of the Forest Service, in Chicago, when he developed the elaborate Bureau of Information on wood. This work brought him thousands of inquiries from all parts of the world.

Sackett specialized in wood from the instant he entered high school and carried his studies through the universities, attending both Cornell and the University of Michigan, from which he graduated in 1906 with the degrees A. B. and M. S. F. (Master of Science in Forestry), completing a five-years course in four years.

Then began his real studies in wood utilization, and soon he became the pioneer in this field, continually broadening his education with the problems that came to him. Just out of college, he succeeded in getting the mine operators to use fire-killed timber in their mines, instead of cutting live wood, thereby saving the country millions of dollars by utilizing the abandoned fire-swept forests and at the same time effecting tremendous savings for the mine owners.

From then on he solved one wood-utilization problem after another, and incidentally turned many a scrap pile into a substantial bank account. Apparently no stumper for him could be found, and he proved that the trained wood expert had as sure a place in industry, commerce, and national development as has the metallurgist or the chemist.

He discovered, at the very start, that the average wood user hasn't the slightest idea of correct wood utilization, and next, that about 75 per cent of the practices of the wood users could be accounted for only by precedent.

A few examples of the problems he has solved will best illustrate his method of working, and also drop a hint to the average wood user.

Once he visited a sawmill sawing persimmon lumber and made a few notes in his ever-handy notebook—and then hied off again with a satisfied smile. He returned a few days later and sought an interview with the mill owner.

"Why are your men so carefully sorting out the different-colored woods?" inquired the inquisitive visitor.

"Because we can use the light-colored sapwood for the making of shuttle blocks and golf-head blocks. But the dark, brittle heartwood won't do for this at all, and so we have to sort it out."

"What do you do with the heartwood?"

"Burn it. There is no market for that sort of stuff."

"Are you sure about that?"

"Sure? Why, we've been burning it for 15 years. I tell you there's no market for that sort of stuff. Little blocks of brittle black wood—who wants the likes of that?"

"Try these people," suggested the U. S. wood expert, dropping a card on the desk. "They make parquetry floors. They are up against it for a good, hard, black wood to match up with white maple in their fancy checkerboard floors. You two ought to get together."

They did, and today the parquetry-floor makers have all the black wood they need, while the persimmon sawmill men are able to sell their former waste.

Again, he found a large wood-manufacturing plant cutting into strips 6 in. wide, fine full-length oak lumber. These strips were next cut into lengths varying from two to three and a half feet.

"What's that for?" inquired Sackett.

"Ladders," came the laconic reply.

"But why cut up that fine lumber for such small pieces?"

"Doesn't grow any smaller. We got to buy the lumber from the mill and that's the way it comes in."

Out came Sackett's notebook again. Two days later he called the ladder manufacturer on the phone and informed him that a neighboring furniture manufacturer had a world of those strips that he would be glad to sell at a low figure, as he had been using them for crating lumber and for firewood.

"Tradition and habit are responsible for a great deal of misutilization and waste of wood," says Sackett. "If our great-grandfathers used one kind of wood we insist upon using the same, though it has grown expensive and scarce, and even if another kind, which is easily accessible, is really its superior. In the use of iron and steel we always consult the metallurgist, but we go on our own in the selection of wood. And we follow the common practice without investigation or question."

"Two days later he called the ladder manufacturer and told him that a neighbor had a world of those strips."

An examination of a plant, manufacturing hickory handles for tools, axes, sledges, hatchets, hammers, etc., disclosed the fact that only the sapwood, or white hickory, was being used, the darker-colored heartwood being discarded as unusable. Questions brought out the fact that it was considered too brittle and weak for tool handles.

"'What do you do with them?' inquired Sackett. 'Sell them for firewood.'"

"Why," asked Sackett of the manager of the plant, "do you say that you can't use the heartwood for this purpose? Have you ever tested the relative strengths of the woods?"

"Certainly not!" came the prompt reply. "I don't have to. There isn't a manufacturer in the country using this stuff, and that's reason enough for us. Besides, the specifications we receive from the big users all prohibit the use of the heartwood. It's too brittle and weak."

"Practically any wood-using concern can cut its wood bill in half."

That, however, did not convince Sackett, and he made a few tests on his own account. He quickly proved that there was practically no difference in the strength of the two woods, and so started to educate the public accordingly. This took several months, but with the final result that the ban was lifted from the dark, heartwood hickory, and that at present all the tree is used for this purpose instead of only half, as heretofore. This means a straight 50-per-cent saving in raw materials to the manufacturers of hickory goods.

A few months later he was called upon to find a market for the dark or heartwood that was being scrapped by the manufacturers of birch spools. These manufacturers of thread and ribbon spools were compelled to make their product from the white birch, or sapwood—owing to tradition. The market simply would not buy dark-colored spools, and the manufacturers were in a quandary as to what could be done with the other half of the wood they purchased.

It happened that Sackett had recently had a rather strenuous session with the owner of a plant that turned the dark-colored birch into imitation-mahogany hairbrush backs, and other toilet articles. This individual was burning his light wood, stoutly maintaining that it was simply folly to attempt to find a market for the small and odd-shaped waste from his workshop.

By bringing these two woodworkers together, Sackett accomplished a triple saving: first, the dark wood that was being burned; second, the light wood that was being burned, and third, half the cost of raw materials to each manufacturer.

On another occasion he found an interesting problem in a rotary veneer plant. There he saw machines peeling endless sheets of veneer from four-foot logs of various "precious" hard woods—mahogany, etc. These veneer sheets varied from 1/16 to 1/4 inch in thickness, and consequently were of necessity taken from only the soundest wood. Because the center or heart of the hard woods is generally defective or rotten, the process of peeling is stopped about five or six inches from the heart of the wood. As a result this plant had an enormous pile of hardwood cores in its yard.

"What do you do with them?" inquired Sackett.

"Sell them to our employes for firewood, or to anybody that wants to use them for crating. Lots of them we burn. There is no market for them, though."

But Sackett already had the answer to this. Not long before, a large coal-mine operator had appealed to him to help solve their mine-roller problem. These mine rollers are placed in the mines for the cables to roll back on and were made from small, lathe-turned trees, the supply of which was rapidly being exhausted. Besides, it had seemed a shame to the mine operator to have thousands of straight young trees cut down for this purpose every year.

"I'll tell you what—just get in touch with this mining company," scribbling the name and address on the back of the envelope, "and offer them your hardwood cores, after you have bored an inch hole through their centers."

This was done, with the result that the veneer manufacturer is receiving a substantial income from his scrap cores, while the mine operator is buying a better grade of mine roller at less than half the former cost, and thousands of young trees are saved each year.

A hundred such examples of how Sackett solves wood-utilization and scrap-saving problems could be cited, but the foregoing are sufficient to illustrate his general method of procedure.

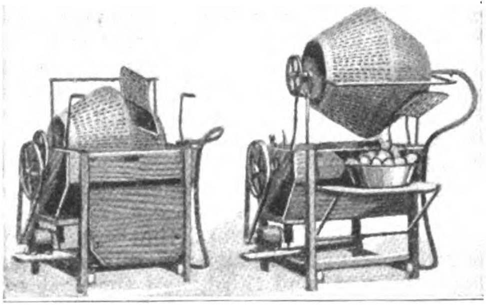
This wood-utilization expert's claim is that by proper methods practically any wood-using concern in the country can cut its wood bill in half, and as a proof of this he saved for the Chicago, Milwaukee, and St. Paul Railway Company a half million dollars on a single year's wood bill. This was accomplished by the use of a score of different methods of scrap utilization and by the proper selection of wood, based upon the specific requirements of each class of work.

Here is a man who has proved absolutely that anyone willing to specialize and dig to the very bottom of any subject can blaze a new trail for industry—for Sackett's methods of wood saving and wood utilization have introduced a new science to the work-a-day world. He is a pioneer in his line and is recognized as such in every wood-using community in America, and in foreign countries as well.

He has been appointed chairman of the Committee of Reclamation for the Milwaukee road, under the order of the United States Railway Administration, and he is not yet 35 years of age.

MOTOR-DRIVEN POTATO PEELER FOR CAMPS AND HOTELS

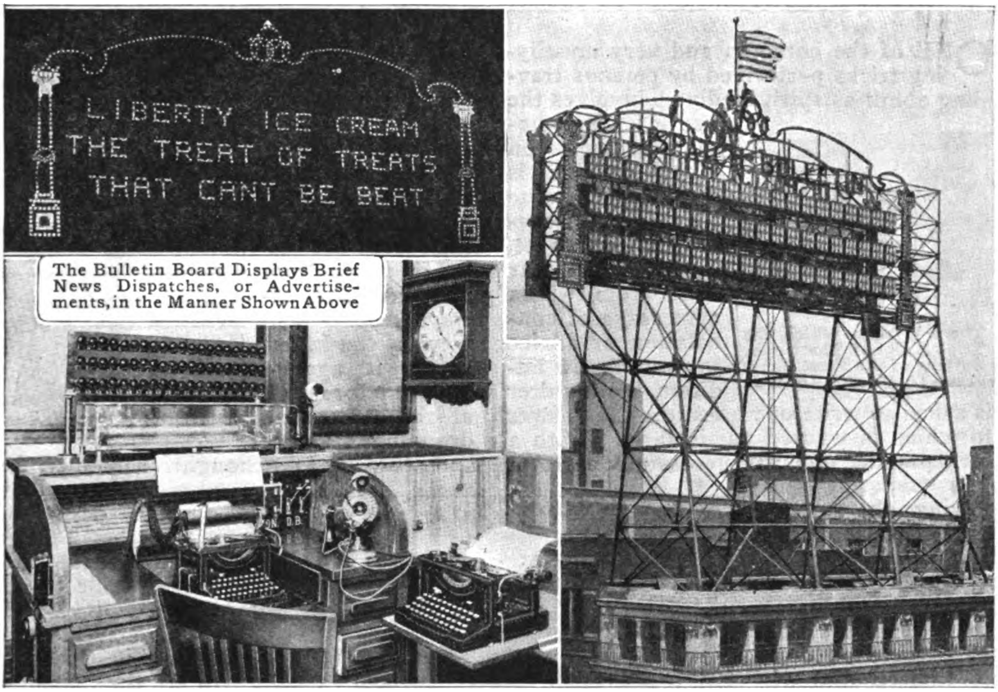
A machine which will peel 40 lb. of potatoes in three or four minutes has been invented for hotels, army camps, etc., the peeling being done by a revolving drum driven by a 1/8-hp. motor. The inner surface of the drum has been roughened by making numerous perforations in the metal. When filled it is lowered into a wooden container and set to running, while a stream of water from a hose, inserted at one end, washes off the particles of skin that are loosened by contact with the drum.



Left, Motor-Driven Potato Peeler with Drum Lowered: The Hose at the Right Injects Water into the Drum as the Potatoes are Tossed About. Right, the Drum Raised and Emptied of Potatoes: Current for Driving the Motor can be Obtained from Any Light Socket

COFFEE IN SOLUBLE STICKS FOR MEN AT FRONT

The government has taken over the country's supply of soluble coffee for the benefit of the soldiers. The coffee is of good quality and is being put up in stick form, like chewing gum, with waterproof wrappers. If for military reasons it is undesirable to light fires in or near the



The Bulletin Board Displays Brief News Dispatches, or Advertisements, in the Manner Shown Above

At the Left Is a View of the Operator's Room, Showing the Typewriter Controller, and above It the Pilot Board. At the Right is Pictured the Display Frame Installed atop the Newspaper Building

trenches, these sticks can be dissolved in cold water, making a beverage that is quite acceptable in the emergency. New companies have been organized to help supply the growing demand for this product.

ELECTRIC BULLETIN BOARD TYPEWRITER-CONTROLLED

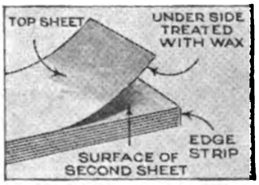
News dispatches and advertising matter are luminously displayed at night on a large double-faced electric bulletin board that is operated by a local paper in one of the mid-western cities. The board is installed atop the newspaper building, where it may be plainly seen by the street crowds. It is equipped with typewriter control, and therefore in method of operation reminds one to a degree of certain printing-telegraphy systems. The display frame is supplied with three rows of 20 squares each, fitted on opposite sides with incandescent bulbs so grouped and wired that any letter or numeral may be formed. The keys of a modified typewriter, included in the circuit, form the necessary contacts, when struck, to outline in the successive squares the various characters they represent. Thus, to flash a bulletin, the operator has only to write it on the typewriter controller, making at the same time a typewritten record on paper. A pilot board before him, arranged with 60 green lamps corresponding to the several squares in the display frame, informs him whether or not the various characters are being illuminated as he writes them. The capacity of each side of the board, obviously, is 60 letters and spaces. A bulletin may be flashed in about 10 seconds. It will remain illuminated until a "kill" key is struck, extinguishing it.

EFFICIENT MAIL SERVICE FOR MEN AT FRONT

The mail service of our soldiers abroad, formerly in charge of the civil authorities, has been taken over by the army, which is now handling with dispatch the 1,000,000 or more letters per day which are received in France from this country, as well as 300,000 letters per day mailed in France for American soldiers in that country. In addition to a big central post office and permanent post offices at various points, there are large warehouses at French ports for sorting the mail, and mobile post offices that move right up to the firing line. Each company has orderlies taking care of the mail for their respective units.

HOW MEDIUMS FAKE MESSAGES FROM THE DEAD

By HARRY E. GIFFORD



The Pad with Which the Trick is Done: The Under Surface of the First Sheet Has a Thin Coating of Wax

ONE of the common and very mystifying tricks performed by persons traveling about as spirit mediums involves the use of a memorandum pad on which the sitter is requested to write the names of several, usually three, departed dear ones from whom a message of consolation or advice is desired. In addition, the inquirer is asked to write one question, the answer to which is wanted particularly. With a little practice one can successfully perform this trick by following the procedure described below.

The medium places the sitter at the opposite side of a table or desk to himself and offers him a pencil and pad of paper on which the data mentioned above are to be written. Apparently there is nothing unusual about the pad. Nevertheless it is one which has been especially prepared in advance, the underside of the top sheet and of one or more alternate sheets below having been given a coating of white wax. Preferably this is done before the sheets are assembled and glued into a pad.

The Sitter Writes the Required Data on the Pad with an Ordinary Pencil

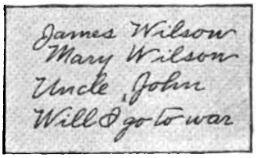
The sitter writes the names of three friends and the important question, as requested. In so doing wax on the underside of the top sheet is transferred to the second sheet through the pressure of the pencil. The sitter is then directed to tear off the top sheet, without allowing the medium to look at the writing, and fold it into a small pellet. This done, the pad is casually picked up by the medium and placed on a projecting drawer or shelf, out of sight of the sitter but in full view of the medium.

Dusting the Second Sheet with a Cylindrical Powdering Utensil, to Bring Out the Transfer

The medium then takes the pellet of paper from the sitter and, always keeping it in view of the latter, places it against his own forehead, at the same time dropping his gaze and scowling in a thoughtful manner. By placing one elbow on the desk and resting his head in his hand the medium is able to obtain a full view of the pad. While pondering in this posture, the medium with his free hand takes a long, cylindrical powdering utensil from a convenient place. This article is covered with black powder and he deftly passes it over the top of the pad. The black powder will adhere to the wax, revealing the names and question.

While Feigning Communication with the Spirits Regarding the Folded Note Held against His Head, the Medium is Dusting the Waxed Sheet So That He can Read the Inscription

Having thus secured the information written on the folded pellet, he hands the latter back to the sitter and pretends that through his power as a clairvoyant he has read the names and the question and recites the contents of the folded sheet as proof of his claim. The medium then engages the sitter in conversation, drawing him out in ways which will enable the trickster to frame a "message" from one of the departed friends which will appear plausible and



James Wilson
Mary Wilson
Uncle John
Will I go to war

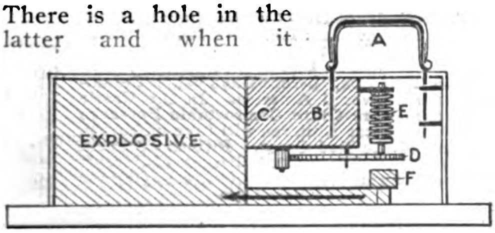
The Result of Passing the Dusted Roller, Shown in the View Above, across the Page Containing the Transfer

give satisfaction. With a little experience one can thoroughly astonish those who act as sitters. It is easy to understand why credulous people on leaving a clever medium will tell their friends how the clairvoyant "read names from a folded sheet which had not been out of sight or opened."

Should the first attempt at having the sitter write on the pad result in an indistinct transfer to the second sheet, complaint can be made that "the spirit conditions were not perfect" or that "the sitter was not in harmony with the occasion." In the meantime the waxed sheet is deftly torn from the pad and the latter handed to the sitter for a second attempt.

TIME BOMBS MAKE GERMAN PLANES SELF-DESTRUCTIVE

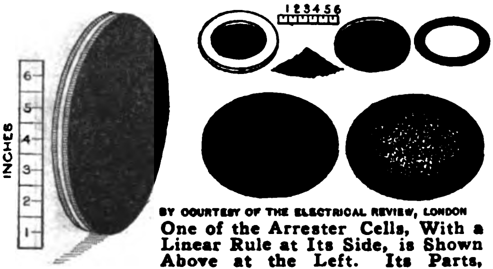
To enable airmen to destroy their machines after making forced landings within the allied lines, nearly all German biplanes for more than a year past have been equipped with time bombs. One of these is installed near an aeroplane's fuel tank. It consists essentially of a detonating mechanism controlled by clockwork and incorporated in a rectangular casting that holds a chamber filled with explosive. A handle at the top of the device, when raised, starts the clockwork, which drives a wheel one revolution in 10 minutes. There is a hole in the latter and when it reaches a certain position, a spring plunger forces through it, striking a detonating cap that sets off the explosive.



BY COURTESY OF LA NATURE, PARIS
Showing Arrangement of Aeroplane-Destroying Bomb Adopted by Hun to Prevent Capture of Planes Forced to Land within Allied Lines: A, Handle; B, Pin That Sets Clockwork in Motion; C, Clockwork; D, Slotted Wheel; E, Firing Plunger; F, Detonating Charge

NEW TYPE LIGHTNING ARRESTER IS SELF-MENDING

Of interest and possible importance in the electrical world is a new type of lightning arrester that has recently been developed. It consists of a series of cells, one of which is comprised of two sheet-metal electrodes covered with a thin film of insulating varnish. They are placed about a half inch apart and the space between them is filled with a conducting powder, lead peroxide, which upon the application of heat is converted into nonconducting litharge. In the event of the voltage rising above normal, the film is punctured in miscroscopic points. Meeting with practically no resistance, the lightning charge grounds. The intensity of the ordinary current then becomes great in the vicinity of the punctured points, resulting in localized heating that changes the conducting lead peroxide in these minute paths of current flow to insulating litharge. Thus the punctured film is resealed. The important phase is that this reinsulating action is accomplished so quickly that an oscillograph of 2,000 cycles per second fails to register its duration.



BY COURTESY OF THE ELECTRICAL REVIEW, LONDON
One of the Arrester Cells, With a Linear Rule at Its Side, is Shown Above at the Left. Its Parts, Disassembled, are Pictured at the Top. Beneath Them are Shown an Unused Electrode and, at Its Right, One through Which Several Thousand Discharges have Passed. The Spots Visible on the Latter Are Insulating Litharge Plugs

TONS OF PURE LEMON DROPS MADE MONTHLY FOR ARMY

Having found that the favorite candy of a majority of our soldiers is lemon drops, and that most of those on the market were made of glucose with artificial flavoring, the War Department undertook to remedy the situation. It obtained the formula for a make of lemon drops which chemical examination showed to be the purest, and now has candy factories turning them out at the rate of 200,000 lb. per month for the soldiers.

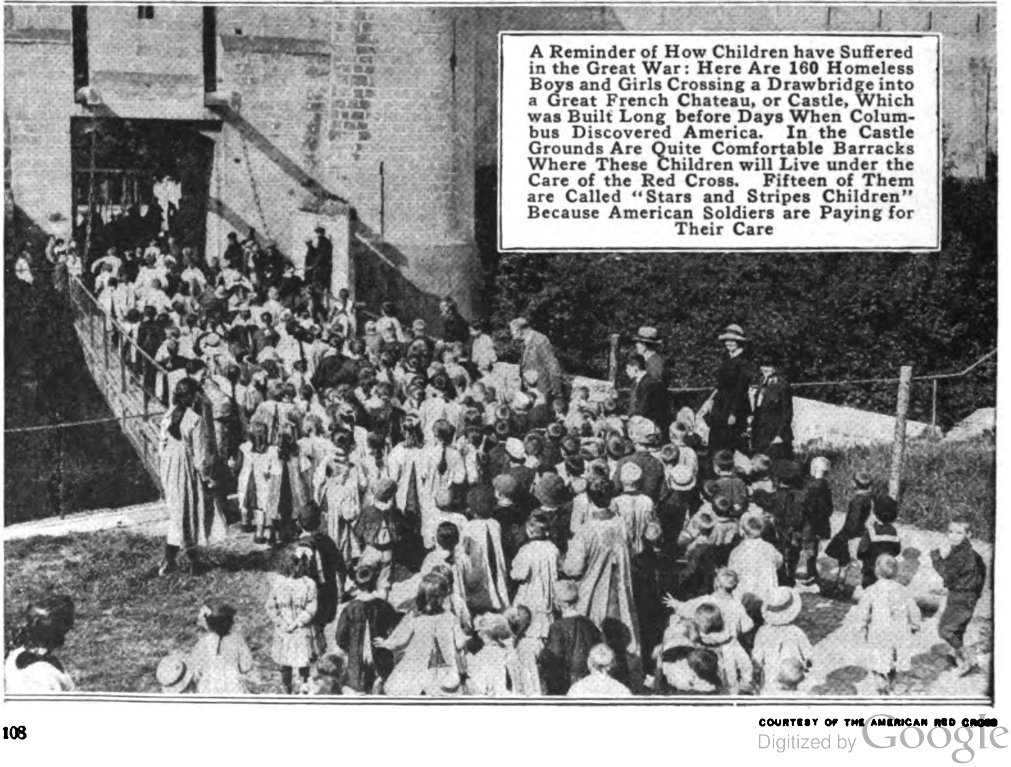
ℂBecause the acetic acid which formerly went into Paris green for garden use, etc., is being used in waterproofing the cloth of aeroplane wings, new sources of this acid had to be found. Fortunately Paris-green manufacturers are now able to secure adequate quantities from vinegar supplied them by yeast manufacturers.

HOW WAR HAS TOUCHED LIVES OF CHILDREN,

If the Supply of American Shipbuilders in These Days has Not been Equal to the Demand, There Is Promise That the Next Generation will be Better Off, for Little Folks, as the Picture at the Left Shows, Already are Learning to Construct Hulls That Have Keels, Ribs, and Decks. To These Frameworks Suitable "Armor Plate" is Fastened

PHOTOS COPYRIGHT, PRESS ILLUSTRATING SERVICE

At the Right They Are Ready for the Launching. This Is Indeed a Busy Shipyard, with One Vessel About to Slip Down the Little Ways and Others in Various Stages of Construction. Tools have been Dropped among the Pieces of Lumber, a Flag has been Fastened to the Bow, and the Little Chap in the Background Is All Ready to Let Go His Cap, Which will be the Signal for Launching



A Reminder of How Children have Suffered in the Great War: Here Are 160 Homeless Boys and Girls Crossing a Drawbridge into a Great French Chateau, or Castle, Which was Built Long before Days When Columbus Discovered America. In the Castle Grounds Are Quite Comfortable Barracks Where These Children will Live under the Care of the Red Cross. Fifteen of Them are Called "Stars and Stripes Children" Because American Soldiers are Paying for Their Care

COURTESY OF THE AMERICAN RED CROSS

AND VARIED SCENES OF INTEREST TO THEM

Here Are Five Little French Boys Enjoying Kindergarten Work Out of Doors. They and Nearly 60 Others are Cared For by French Sisters and the American Red Cross at a Place Not Far from the Castle Shown on the Opposite Page. The Bench was Made by Older Boys Who have been Taught Carpenter Work

COURTESY OF AMERICAN RED CROSS

This Baby Squirrel Is Only Two Weeks Old, But He has Learned to Nestle in the Warm Hand of His Protector and to Take His Dinner from a Doll's Wee Nursing Bottle, having been Cared For in This Way Since He Was Six Days Old

A Real Clubhouse for Boys 60 Feet above the Ground, in a Great Oak Tree in New Haven, Connecticut: It Measures 12 Feet Square and Has a Two-Foot Porch Running All around It. Before the War the House was Equipped with a Wireless Outfit

This Group of Cincinnati Schoolgirls have Shown Their Patriotism by Knitting This Handsome Hospital Blanket, in the Center of Which Is a Big Red Cross. The Stars and Stripes Above and the Initials at the Left of the Cross will Tell Their Own Story to Every User

SPECIAL RADIATOR SECTION A HUMIDIFIER

To overcome the unhealthful dryness of the air in steam-heated rooms, a special section is being manufactured for incorporation into steam radiators. Outwardly it resembles other sections, but in reality it is a water container with a hinged top, for convenience in filling. A slot in the top permits the moisture to escape into the room, while steam from adjoining sections passes through its hub only. An automatic valve, which is intended to keep the steam in circulation and make an air valve unnecessary, can be installed in this section if desired. This valve is provided with a condensing coil to which live steam is constantly drawn from various parts of the radiator. By this means the section is supplied with water for evaporation.

BAD WEATHER HAS NO TERROR FOR THE YANKEE NURSE

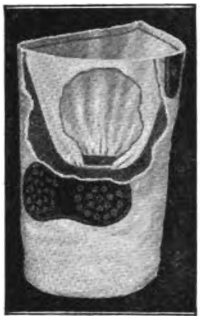
For rainy-weather wear in France, the American nurse is supplied with waterproof togs such as are worn by the young woman pictured in the accompanying illustration. Warmly dressed in this weatherproof apparel, she is protected against cold and dampness wherever duty sends her.

ℭSplendid evidence of patriotic spirit, with a lesson which is obvious to every civilian, is found in the fact that the men at the Great Lakes Naval Training Station, out of their pay of $32.50 per month, subscribed for $2,500,000 worth of bonds of the fourth Liberty loan.

BRITISH SAVE LUMBER BY REUSING BOXES

Substantial gifts to the British Red Cross, and a correspondingly large saving of lumber, have resulted from the request of a British firm dealing in foodstuffs that retailers promptly return the cases in which they receive their goods. It was agreed that whatever saving resulted from using the old packing boxes would be turned over to the Red Cross in the name of the grocers. The first contribution was made at the end of three months and amounted to $4,700.

FEED-BAG SHIELD PREVENTS LOSS OF GRAIN



A shield has been designed for horses' feed bags which prevents all spilling of grain while an animal is eating—a loss which sometimes amounts to 25 per cent. The device consists of a funnel-shaped apron of cloth, with a sufficiently large opening at the bottom, which fits inside the bag, being attached to the upper edge and extending about halfway down into the container. The lower end is gathered by means of a coiled spring and fits snugly about the horse's nose so that no matter how much the animal tosses its head, no grain is lost.

KINDS OF FIBER IN ROPE DETECTED BY NEW TEST

The Bureau of Standards has adopted a method of testing Manila rope, the essential features of which include freeing the fiber of oil and soaking it for a brief period in a bleaching solution, to which acetic acid has been added. Following this, the rope is rinsed in water and then in alcohol, after which the fibers are exposed to ammonia fumes. This turns Manila fibers russet-brown, while others turn cherry-red.

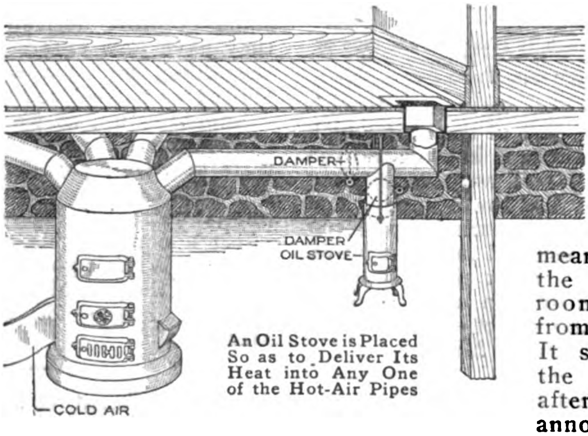
ℭDistribution in Germany of French, English, and American newspapers containing accounts of allied successes, has been "verboten."

In conformity with the wishes of the Fuel Administration that all possible means of saving fuel be employed this winter, we are presenting in this issue a number of articles giving the methods used by some of our readers. It is hoped that they will be of assistance as regards this vital factor in "winning the war."—Editor.

Auxiliary Oil Burners in a Hot-Air Furnace

By H. E. GIFFORD

MY furnace heated four rooms on the first floor and five rooms on the second floor. Coal was scarce, and had to be obtained in 100-lb. lots, on the go-get-it plan, and drawn on a sled. When the furnace was banked, or kept low, it was impossible to heat all the house. One room on the second floor was rented to a couple, and the wife did not leave her room until noon. It must be without chill from eight o'clock in the morning until then; in the evening the room must be comfortable from 6:30 to 9:30. To place an oil stove in this room meant the burning of unnecessary oil by the occupant of the room, and much running up and downstairs with oil or oil stove; so a plan was contrived to take the chill from the room without building a large furnace fire, or going to the second floor. The same plan remedied the difficulty experienced in heating the parlor on the first floor when the wind was blowing in such a way as to produce this trouble.



An Oil Stove is Placed So as to Deliver Its Heat into Any One of the Hot-Air Pipes

A drop pipe was added to each service pipe of the furnace, with attachments for hooking the oil stove in the bottom of the vertical pipe. A damper was placed in the upper end of this pipe section, to be closed when the oil stove was not burning. In the morning, at the required time, we went to the basement, and, turning the damper, lighted the stove; with the damper in the supply pipe from the furnace closed, the heat from the oil stove heated the room occupied by the couple in a short time. The stove was extinguished at the proper time, and the same plan was followed in the afternoon, and for the parlor when occasion required.

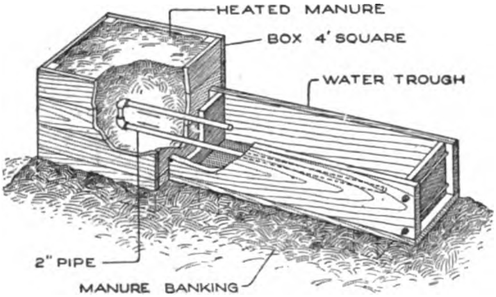
With a low or banked furnace fire, there is very little auxiliary heat required. There is thus an advantage, even in very cold weather, in having a means of regulating the heat of each room, separately, from the basement. It saves running to the rooms to look after the stove and annoying the occupants. Besides, it is much nicer to have the heater removed from sight, instead of in the room where one is sitting.

However, the seasons when no fire is kept in the furnace are the best times to feel the great advantage of this plan. One can take the chill from a room at any time, just as though the furnace were working. One may warm any single room, or several, one after another, with the same oil stove; if two or more must be heated at the same time, the same number of oil stoves will be required. Even where there are a number of such rooms, several stoves in the basement will be found more economical than burning coal, as they can be turned off any time.

Where gas is available, especially natural gas, it is, of course, more convenient to place permanent downward pipes in every hot-air pipe, and have a gas burner in each like those used in gas stoves. If gas is not obtainable, one may still have a permanent oil burner, such as are used in some oil stoves, but the style used by the writer was the ordinary small oil stove, with a handle to carry it around.

Keeping a Water Trough from Freezing

The arrangement illustrated will be found to have considerable effect in keeping from freezing the water in a trough on the farm. The part of the pipe which is covered with manure is heated, and the water flows upward, cold water being then drawn in through the lower pipe. The effect will, of course, be much greater if a coil of pipe is imbedded in the manure. It should be placed rather above the center of the manure box, in order to have the greatest heating effect.—R. M. Magnus, International Falls, Minn.



The Water in the Trough is Heated by a Pipe or Coil Imbedded in a Box of Manure, and is Thus Kept from Freezing

Saving Fuel in the Plant Which Burns Oil

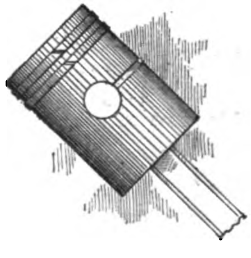
The oil-burning steam-heating plant of which I have charge was supposed to be running as economically as was possible in practice. However, when the price of fuel oil began to go up, I saw that it was up to me to do better. Knowing that there was no big waste anywhere, it was obvious that if any saving was to be effected, it must be in little things. Consequently, beginning at the fires, I relined and refloored the furnaces, or fire boxes, under each boiler with fire brick, taking great care to give just the proper amount of air vents in each floor. The water and oil pumps were then thoroughly overhauled; quite a saving was made here, as the pumps could run more slowly when they were in perfect condition. All steam traps were also put in good working order. A coil of pipe was put in the smokestack, to superheat the feed water just before it entered the boilers. I also had the boilers cleaned each week, instead of every two weeks, as formerly.

The big saving, however, was made in the management of the fire itself. In burning fuel oil, it is necessary to have the mixture of steam, oil, and air exactly right to get perfect combustion. If too much oil is admitted, it not only wastes oil at that time, but it also deposits soot in the boiler tubes, so that even with a perfect fire, after the soot has been deposited, there is a great loss of heat until the tubes are cleaned. The plan by which a nearly perfect fire was secured is this: Each evening, when the fires are put out for the night, I personally inspect each boiler, and whenever soot is found in the tubes I have the fireman brush them. As everyone dislikes this job, it being so hot, dirty, and disagreeable, the firemen soon got to watching the fires much more closely, and, seeing the benefits in personal comfort derived from clean fires, they have now entered into the spirit of the thing, and vie with each other in getting as perfect combustion as possible.

Summing up, as we have reliable data showing our evaporation of water, I can state positively that our saving is at least 4½ per cent, and am quite sure that similar attention to minor things will effect a considerable saving in all steam plants. While apparently the percentage is small, the actual amount of fuel saved is quite large.—M. L. Lowrey, Livermore, Calif.

Lubricating Piston Pins on V-Type Engines

In the modern V-type high-speed engines, where the cylinders are very small, the proper lubrication of the piston pin is a difficult matter and has given considerable trouble, especially with aluminum pistons. Because the cylinders are placed at an angle, the oil is drained to the lower side, and the pin bearing receives less oil than in the vertical types. The bearings are also small, due to the

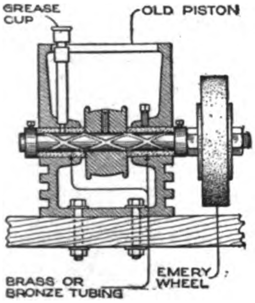


small cylinders, which tends to increase the difficulty of proper lubrication.

This trouble has been overcome, in one of the famous foreign aeroplane engines, in a very simple manner. The same method has since been used on several automobile engines with entire success. A groove is cut from bearing to bearing on the top side of the piston, as shown in the illustration. The oil collects in the groove, and drains into the piston-pin bearings. The depth of the groove in the piston depends upon the thickness of the piston at that point, and care must be taken that the wall is not weakened too much.—S. E. Gibbs, Urbana, Ill.

Bench Grinder or Polishing Head Made from Old Piston

A badly worn piston from an old gas or automobile engine can easily be made into a bench grinder or polisher. The piston-pin bearings are best fitted with a brass or bronze bushing, or a bearing can be poured with babbitt around the shaft. The belt pulley, being placed inside the piston, is surrounded by the piston wall, forming a splendid belt guard. The grease cup, mounted as shown, furnishes lubrication, and the oil or grease should be distributed by means of grooves cut in the shaft. Emery or polishing wheels may be mounted on one or both ends of the shaft, which is held in place by collars with setscrews. The piston may be bolted either to the bench, or to a special stand made for it. The stand should, however, be very stiff to withstand the high speeds at which these tools are run.

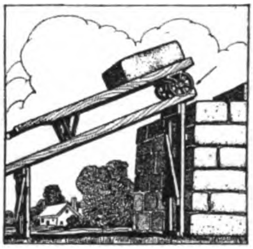


Keep the Coal Wet

One way of saving coal, which is widely known but not so widely practiced, is by keeping it wet. It is found by tests, that coal which is kept exposed to the air, loses a considerable percentage of its fuel value by gradual oxidation. This can be eliminated by keeping the coal under water, or it can be reduced very largely by keeping the coal wet.—John J. Spaulding, Zanesville, Ohio.

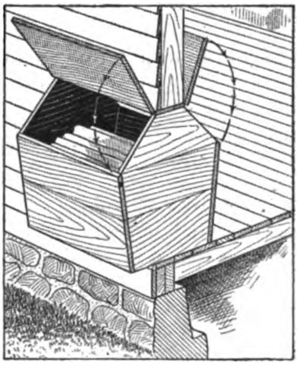
Moving Heavy Stones into Place on a Wall

In moving heavy stones to the top of a wall, a low truck or barrow was used on a broad plank, which formed an incline and had at its upper end a groove, in which the upper wheels could rest. The truck, carrying a heavy stone, was pushed up the plank, until the wheels fell into the groove; the handles could then be lifted so as to slide the stone off onto the wall, without danger of sliding back down the incline, and without the necessity of placing any blocks back of the truck wheels. As the placing of such blocks would require the labor of an extra man or boy, considerable expense was saved by this arrangement.—J. G. Allshouse, Vandergrift, Pa.



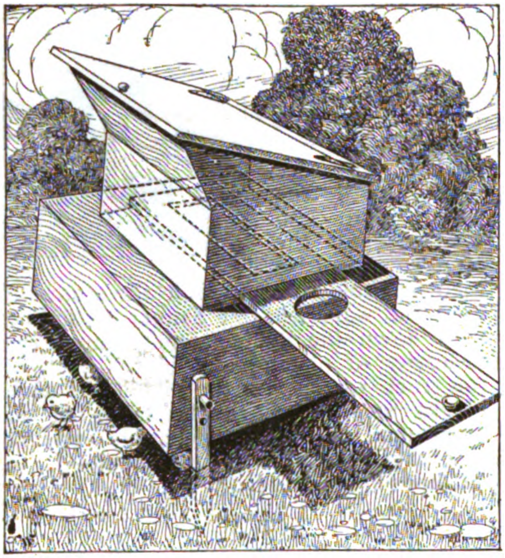
Wood Box Built into Wall of Kitchen

Carrying wood into the kitchen for use in the range is one of the chores which nearly every farmer's boy dislikes. It is troublesome because doors must be opened and closed while the arms are full, and because it is difficult to keep the wood from striking against objects in the kitchen. A better and cleaner way is shown in the sketch. The wood box is built into the wall; the wood is thrown in from the outside, and can be lifted out by opening another door on the inside. The outer door should be fitted quite closely, and may be packed with felt, or several thicknesses of cloth, in order to keep out the cold air. The "dead air" in the wood box will then form a good heat insulator.—P. T. Hines, Raleigh, N. C.



Poultry Feeder Places Food for Chicks Out of Hens' Reach

The chicken feeder here shown is designed to place the proper amount of grain within reach of the young chicks, but out of reach of the hens. A box, in the bottom of which a slot, several inches wide, has been made, is inverted and fastened to stakes driven in the ground, so that one edge stands just high enough to permit the chicks to pass underneath. The bin placed on top is made from another box, and may have one edge flared out as shown, so that the grain can be dumped in with less danger of spilling. The slot in the roof of the lower box is covered by a board twice as long as the box, with a round hole at its center. This board slides back and forth endways, the ends of the bin being cut out to fit it. Each time it is shifted over, some grain is permitted to fall through onto the ground. This amount can be adjusted after some experience by changing the speed at which the board is shifted.


The Edge of the Box Is Just High Enough to Give Access for the Small Chicks, While Excluding the Hen. Shifting the Board Drops a Supply of Grain to the Ground

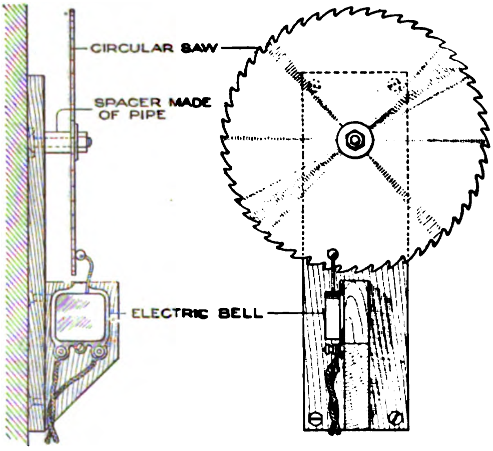
The bin is provided with a hinged cover, so that a'l grain except that which has been dropped on the ground is protected from the weather. At night, or in rainy weather, if the pegs are removed from the stakes and the box dropped to the ground, the grain remaining will be protected from getting wet or from the ravages of small prowlers.—F. W. Vroom, East Lynn, Mass.

Thermometers Save Coal in Small Plant

In a small manufacturing plant it was the night watchman's duty to fire the boiler and keep the place heated; in order to be sure not to have any freeze-ups, he kept up more steam than was actually needed. To overcome this we placed a thermometer at each station where the watchman had to stop when making his rounds, so that he could see the actual temperatures, and keep the various departments properly heated without waste. This eliminated guesswork, and as he did not have to fire his boiler so often, he saved time, labor, and an amount of coal that paid, many times over, the cost of the thermometers. In many small plants, the only places where a thermometer can be found are the boiler and engine room, and possibly the office. In the home also, a small investment in thermometers will pay good dividends in coal saved.—M. Bush, Bloomfield, N. J.

Discarded Circular Saw Forms Loud Bell for Use in Shop

A shop, which needed a loud bell for signaling, and possessed some old worn-out circular saws, made use of the combination of circumstances by rigging up the bell illustrated. A rather powerful electric bell furnished the tapper and the magnet, while one of the saws was mounted on a bolt through the center hole, to be struck by the tapper. The result was a sound which could be heard above the noise of the shop machinery.



A Circular Saw Which had Outlived Its Usefulness as a Cutting Tool was Made to Do Service as a Powerful Noise Maker by Combining It with the Mechanism of an Electric Bell

Automobile-Exhaust Heater Mounted in Floor Register

By C. C. SPREEN

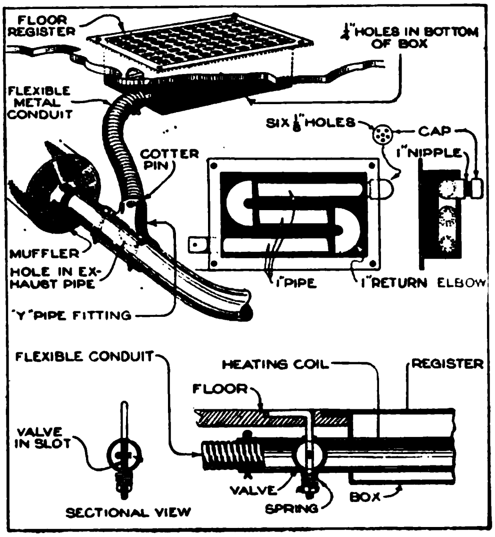
HEATERS for automobiles are made in various ways, most of them utilizing the heat of the exhaust, since this heat is otherwise wasted, and can readily be piped to some form of radiator. Notwithstanding the apparent simplicity of such systems, the manufactured ones are often fairly expensive, and their installation is none too simple.

On most cars it is possible to cut a rectangular hole in the floor boards and install a small register, such as is used with hot-air furnaces. A radiator can be built into the register, as illustrated. The exhaust end of the radiator is plugged with a nipple and pipe cap, a number of small holes being drilled in the cap to enable the gas to escape after having done its work. At the intake end of the radiator, some form of low-pressure valve should be placed. In the one illustrated, a ⅜-in. steel rod is bent to form a lever at the upper end, the lower end projecting through the pipe and carrying a nut and a spring to keep the proper tension. The valve consists of two thin steel disks with an asbestos disk between them, and is fastened with a cotter pin in a slot sawed in the ⅜-in. rod. The asbestos disk is slightly larger than the steel disk. While such a valve, of course, is not able to withstand any considerable pressure, it will close the pipe nicely in an installation such as this one.

A cotter pin is placed through the rod, just above the pipe, to take the thrust of the spring and hold the valve in proper position. The bent upper end of the rod may be sunk into the floor, where it will be out of the way but easily turned by a touch of the driver's heel.

The exhaust gas is taken from the main exhaust pipe through a flexible metal conduit, one end of which is fastened into the radiator pipe with a cotter pin, and the other similarly fastened into a lateral, or "Y," pipe fitting. This fitting may be bolted around the exhaust pipe, one side of it being cut out so that it can be slipped over the pipe, in case the exhaust pipe is so arranged that the fitting cannot be readily slipped over its end. A hole is made in one side of the exhaust pipe where the "Y" is to come.

The heating efficiency will undoubtedly be higher if the exhaust pipe is tapped between the engine and the muffler; this may, however, involve some possibility of a noisy exhaust through the radiator. Installing the Y-fitting beyond the muffler has the additional advantage that less dirt will enter the radiator, and that the possibility of its becoming overheated from badly timed engine valves is almost eliminated.



A Radiator Built of Iron Pipe, Fitted into a Floor Register and Heated by the Exhaust from the Engine, Overcomes Largely the Discomforts of Winter Automobile Driving

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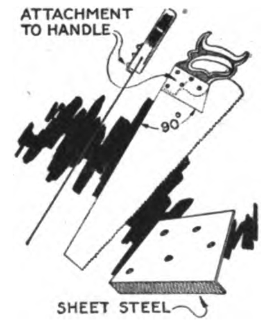
Handsaw Fitted with Attachment for Use as Square

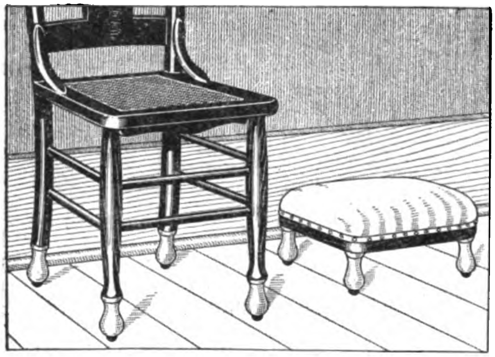
A small fitting for a handsaw, that will not affect its use for ordinary purposes, but will add to the general utility of the tool, especially for quick, or rough work, is a square fitted to the handle. The attachment is made of sheet steel, shaped as shown, and drilled for fastening to the wooden handle. The adjustment should be made very carefully to 90°, to insure that the square will be useful for the purpose intended. The practical features of this kink will be readily appreciated by mechanics.



¶ Pulverized asbestos and plaster of Paris in equal parts by weight, and water sufficient to make a soft paste, make an effective asbestos cement.

Base Knobs or Door Bumpers Put to Various Uses

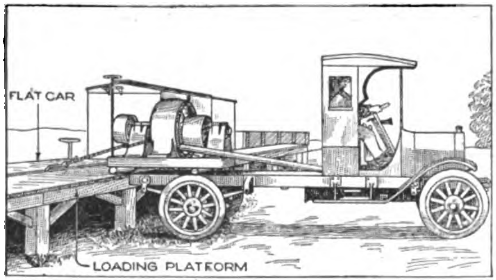
Base knobs, which may be purchased for from 2 to 10 cents each, may be used for many purposes besides acting as door stops. An ordinary chair may be made higher for a child's use by simply screwing a knob into the leg of each chair. A novel footrest may be made from the top of a discarded organ stool by screwing four of these knobs into the underside. Small tables may also be made higher by this means.—Mrs. Grace E. Willey, Concord, N. H.



Base Knobs, Such as are Placed behind Doors to Keep Them from Marring Woodwork, Are Useful for Purposes Such as These

Unloading a Heavy Machine from a Truck

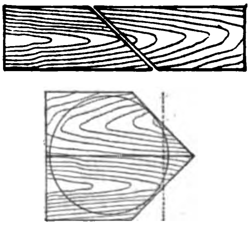
A man who had the job of unloading heavy machines from a truck was confronted by the shortage of labor, and employed a method which made use of the power of the truck for moving machines. On backing the truck up against the loading platform, the machine was moved by means of levers, so that the base of it projected about 10 in. from the rear end of the truck. It was raised slightly, so that a roller could be placed under it. While a rope and hook then held the machine from moving, the truck was moved forward a short distance, under its own power. It was then gently backed against the platform again, the machine thus moving farther onto the platform, and enabling more rollers to be placed under it. With the rope shortened, the operation was repeated, until the machine rested entirely on rollers on the platform. By means of a pole, the machine was then pushed, a short distance at a time, onto the flat car beyond the loading platform. The process should be attempted only by a truck driver who is thoroughly familiar with the clutch action of his truck, as too great a movement of the truck might easily prove disastrous to the load.



By Moving a Truck Forward and Back under Its Own Power, Heavy Machines are Unloaded from It on Rollers, and Pushed onto Flat Cars

Lumber-Saving Kink for Making Split Patterns

To make a circular, split pattern, it was necessary to cut two semicircular pieces of wood. A piece of material was found which was suitable, except that it was not quite twice as long as the diameter of the circle. The diagram shows how this stick was nevertheless used, by sawing it at an angle. The dotted line shows how much too short the stick would have been if it had been cut at right angles.—C. W. Thunen, Benicia, Calif.



Extinguishing Spontaneous Fire in a Coal Pile

A large pile of coal was found to be on fire, due to spontaneous combustion. A hose and water pressure were available, but it was found difficult to make the water penetrate deeply into the burning coal. The difficulty was overcome by attaching to the end of the hose a 10-ft. length of 1-in. iron pipe. The other end of the pipe was thrust into the pile as far as possible, and the water turned on. As the coal directly in front of the pipe was gradually forced away by the water pressure, the pipe was thrust farther in. Occasionally a large lump was encountered, which would have to be broken by blows of the pipe itself acting as a hammer, or of a heavy hammer applied to it. After driving several holes into the interior of the coal pile in this way, the fire was found to be extinguished.—Maury Robinson, Paris, Tex.

Sheet-Metal Backing Helps When Sawing Softer Materials

When attempting to cut a very brittle piece of hard rubber, fiber, or asbestos sheeting with a hacksaw, especially if only a small vise is available for holding the work, it is well to clamp the material between two sheets of tin or other thin material. The resulting cut will be true, smooth, and firm-edged. This is particularly helpful in the case of cutting materials such as asbestos.

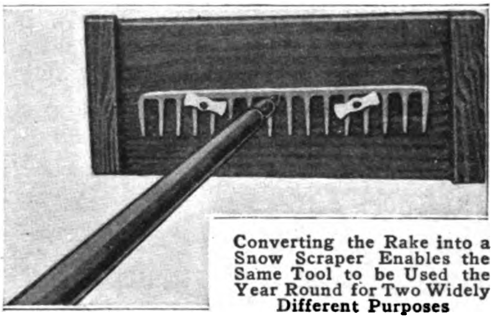
Dissolving Boiler Scale Saves Fuel and Provides More Heat

One means of saving coal, which is applicable to any hot-water heater or steam boiler where hard water is used, is that of keeping the boiler clear of scale so that the heat can reach the water, instead of being wasted to a large extent in the chimney gases. When starting a fire, if a small can of potash, dissolved in about a gallon of water, is poured into the boiler, it will help greatly to loosen the scale as the fire starts to burn. After the system has become thoroughly heated up, the fire should be allowed to die out and the boiler to cool down. The water is then drawn off, carrying with it the scale which has been removed, and the boiler is filled with fresh water and is then ready for service. It should be remembered, however, that there are many kinds of boiler scale, depending on the composition of the water used, so that the efficacy of this method in any particular boiler can only be ascertained by trial.

Other kinks which should be remembered are to keep the flues clean by frequent attention to them, and not to shake the fire too hard, as this often causes coals which are only partly burned to fall through into the ashes.—F. H. Sidney, Wakefield, Mass.

Snow Scraper Made from Rake

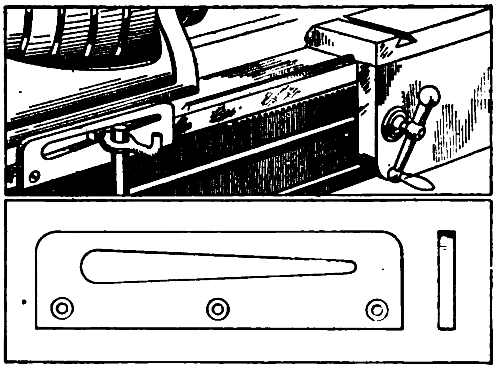
A rake in wintertime is almost as useless as a snow scraper in summer; therefore a device which enables the rake to be converted into a snow scraper will practically make two tools out of one. This is easily done by getting a 1-in. board, about 9 by 18 in. in size, and fastening it onto the rake by some such means as is shown in the photograph. Strips should be nailed across the ends of the board to strengthen it. For light snowfalls especially, the tool will be found even more useful than the ordinary snow shovel.—J. H. Shadek, Oradell, N. J.


Converting the Rake into a Snow Scraper Enables the Same Tool to be Used the Year Round for Two Widely Different Purposes

Wrench for Setscrews in Dogs Attached to Lathe

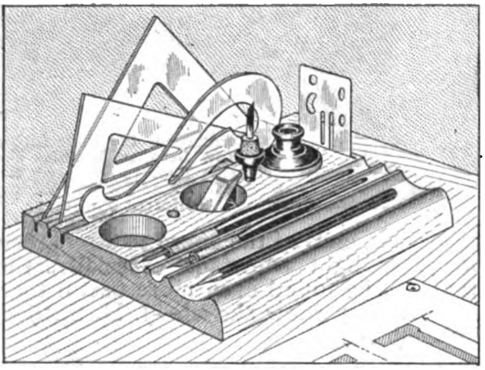
A simple addition to the bed of a lathe will save time for workers who have frequent use for dogs of various sizes. In using this form of wrench, instead of holding the work in one hand with the dog attached, and tightening or loosening the screws with a wrench held in the other hand, the work itself forms the wrench, and the setscrew head is inserted in the tapered slot which grips it like a vise.

The advantages of this form of wrench are, of course, that it is always handy and never gets lost, that it takes all ordinary sizes of setscrew heads used on lathe dogs, and that the operation of tightening or loosening the dog requires fewer operations, and therefore less time when this form of wrench is provided.


A Sheet-Iron Wrench Attached to the Lathe Bed Saves Time in Loosening and Tightening Setscrews in Lathe Dogs

Handy Rack Holds Draftsman's Tools

A rack, which will keep most of the draftsman's tools safe from being pushed off the table, is easily made from a single block of wood. The work will, however, be much easier if a buzz saw and some large auger bits, or an expansion bit, are available. The size of the block can be varied to take different combinations of triangles, ink bottles, etc. In the rack shown, the three circular holes are suitable either for a bottle of ink, or for holding such small objects as erasers, extra leads, or thumb tacks. Small holes beside these are made to hold the ink-bottle stoppers. Any number of semicircular grooves can be made in front; if red and black ink, for instance, are both used, one groove may be painted black and the black penholder used in black ink may be kept in it, another groove being similarly painted red for the red pen. —D. D. Symmes, West Haven, Conn.



The Draftsman Who Keeps His Tools in a Rack will Have Less Trouble in Finding Them and More Room on His Table

Building Heavy Doors in Place Saves Trouble of Hanging

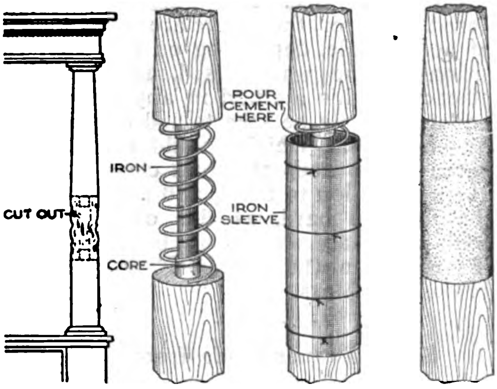
When heavy barn or outbuilding doors are to be hung, many farmers build the doors complete and then hang them. It is thus often difficult to prevent sagging while mounting the hinges. A better way is to nail in place the frame for the door, the nails being driven in only part way. The door planks are then cut and fitted in place, as though they were to be a stationary part of the structure. Sufficient space must, of course, be left around the door openings so that it will swing freely. When all the door planks are in place, the hinges are attached, and the nails holding the frame in place are drawn out, allowing the door to swing free. Double doors may be built in one piece, and sawed in two in the middle after the whole door is completed.

Small Piece of Glass Is Useful in Tool Grinding

When grinding a tool to a master gauge or template, or to cut a standard thread, lay on the tool a small piece of window glass, and place the gauge flat against the other side of the glass. A piece of glass, 1 by 2 in., is a great convenience in a mechanic's tool box. To prevent cutting of the fingers, the edges may be smoothed down with a whetstone.

Repairing a Pillar with Cement

A wooden porch pillar, which has rotted out at one point, may be repaired at a very slight cost, as shown in the sketch. First cut out the rotted portion, leaving projections on both ends at the center of the pillar, as shown. Cut a piece of iron pipe, just long enough to drive in between the two pieces, and wind some stout wire around to act as reinforcement. Then bind a piece of sheet iron around the lower segment, extending up to within about 2 in. of the upper segment, leaving enough space for pouring cement. Line up the top of the sheet iron with the surface of the upper part of the pillar, and pour full of cement. After the cement has dried for about three days, remove the sheet iron, fill the gap with cement, and trim up defects. If the repaired post is repainted, the joints will be scarcely noticeable.—E. Stumpf, Jersey City, N. J.



A Wooden Pillar Which has Begun to Rot can be Repaired Quite Satisfactorily by Means of a Piece of Pipe, Covered with Cement

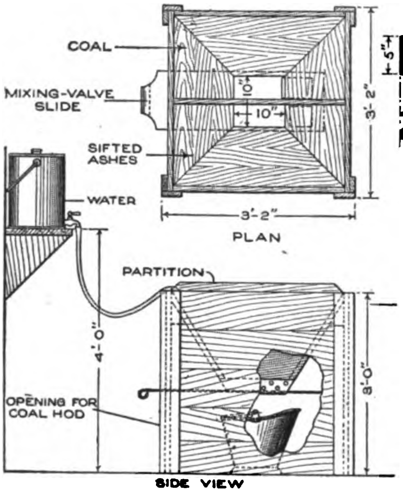
Save Coal by Burning Ashes

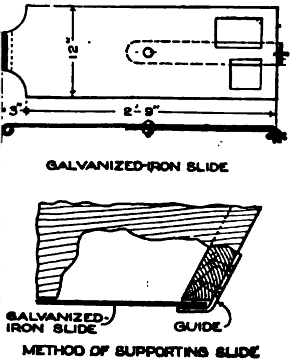
By P. P. AVERY

IT is quite well known that when fresh coal exclusively is burned in a large stove or furnace, the ashes which are shaken down nearly always contain a considerable proportion of unburned coal or coke. Anyone who is careful of the amount of coal he uses must take some means of recovering the good coal from the ashes, and burning it over again. To do this, it must be mixed with fresh coal, and mixing it in the proper proportion with a shovel, or with several coal hods, is sometimes a job which is so tedious as to be frequently neglected, sometimes to the extent of even wasting the partly burned coal.

With this in view, a mixing hopper was constructed in an old wooden box. The bottom of the hopper is made to come about 13 in. from the floor, so that a coal hod can be set under it; this bottom consists of a valve, or slide, made of heavy galvanized iron. In it are two rectangular holes, one for each of the two halves into which the hopper is divided by a wooden partition. One of these openings is made 50 per cent larger than the other one, because it is necessary for best results to have a rather greater volume of fresh coal than of the partly burned coke. The back end of the iron slide is bent down slightly, in order to prevent it from slipping out from the two guides which support it at the sides, and the front end is shaped to form a handle, either by bending it over, as shown, or by cutting out a hole to fit the hand. Underneath this part, the front side of the box is cut out large enough to permit the coal hod to be pushed in. It is better not to have any more of the box open than just what is necessary in order to insert the coal hod, because the sides of the box are effective in keeping the dust confined.

In using the hopper, the coal is dumped or shoveled into one side, and the ashes, thoroughly sifted and cleared of clinkers, are thrown into the other side. With the empty coal hod standing underneath, the valve is pulled out and pushed back several times, or until the coal hod is full. The fuel will be thoroughly mixed, in the proportion which is fixed approximately by the relative size of the two openings in the slide. The exact size of these openings will, of course, depend somewhat on the kind of fuel burned. It will therefore be advisable at first to cut the larger of these openings slightly smaller than the half of the hopper bottom, so that either opening can be enlarged if the mixture is not just right. If still more accurate results are wanted, it is entirely possible to attach to the bottom of the slide a strip of iron which swings on a pin, as shown in the detail, so that a slight change in its position increases the size of one opening and decreases the size of the other.





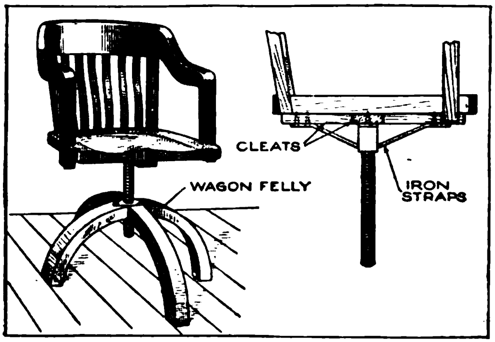
Fresh Coal and Partly Burned Ashes are Dumped into the Two Sides of This Mixing Hopper, and the Valve Mixes Them in Proper Proportion As the Slide is Shaken Back and Forth

A good deal will depend, of course, on the skill developed in using the mixing hopper, as, for instance, the handling of the slide. The mixing will be much more thorough if the slide is kept in motion, by shaking it back and forth while the fuel is falling through. Better results will often be obtained by sprinkling the ashes with water; a 5-gal. oil or gasoline can filled with water can be mounted on a shelf near the hopper, and a rubber hose then makes this sprinkling very easy. The partition should be built a few inches higher than the sides of the box, so as to make it less likely that stray lumps of fuel will fall into the wrong side of the hopper. By this thorough mixing, in the proper proportion, of fresh coal and partly burned ashes, the weekly coal consumption of an ordinary kitchen range, carefully measured, was reduced from 14½ hods a week to 10 hods, the amount of cooking and heating being the same.

The mixture is especially useful for banked fires in cold weather, which need not be very hot, but must last through the night.

Swivel Chair Made from Wagon-Wheel Fellies

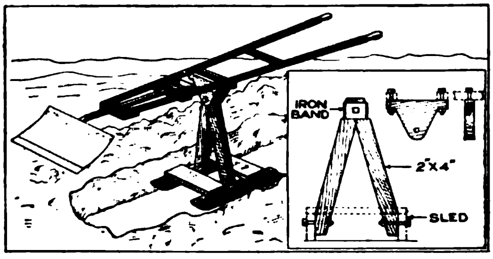
A useful and not ungraceful swivel chair was made by removing the broken legs of an old chair and mounting the good portion on a base made from two pieces of wagon-wheel fellies. An iron bar, 1 in. in diameter, was threaded and made to work easily through a threaded hole in the fellies, strengthened by the addition of a metal blade on top. On the bottom of the chair seat, two wooden strips were fastened with screws, at right angles to each other, crossing in the center. The end of the iron rod, sharpened to a square point, was driven into a tapered hole in this center, and was braced by two iron strips, tapped out to take the thread on the bar, screwed into position as shown, and fastened with screws.—Charles Black, Jr., Hightstown, N. J.



After Having a Leg Broken, This Chair was Converted into a Swivel Chair by Mounting It on Two Pieces of the Felly of a Wagon Wheel

Lever-and-Fulcrum Snow Shovel Makes Heavy Shoveling Easy

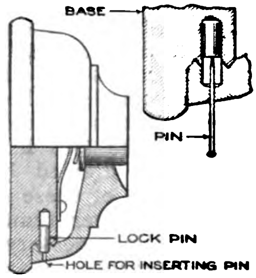
For heavy snowfalls a hand-derrick shovel gives the user a great advantage over the old-style shovel. Simply mount on a sled an upright frame made of 2 by 4-in. lumber; upon this as a pivot, a pair of handles is bolted, to which is attached an ordinary shovel. The upright frame is 24 in. high, and it also swings, on the two bolts at the bottom. The width of the sled is 12 in. The sled is made of two pieces of 2 by 4-in. timber, with lighter pieces nailed across. The handles are 5 ft. long, or more; three braces hold them secure for heavy lifting. Large screws fasten the handles to the triangular-shaped pieces, and bolts hold the shovel to the handles. At the rear the handles are 2 ft. apart and taper to 3 in. apart in front.—F. E. Brimmer, Dalton, New York.



The Lifting of Heavy Shovelfuls of Snow is Avoided by Mounting the Shovel on a Fulcrum

Push Button Locked against Interference by Children

Many small boys take pleasure in unscrewing covers from electric push buttons, often losing or disconnecting parts of them. The illustration shows how they may be protected against interference by anyone who does not understand the method of opening them. Unscrew the cover or cap, and determine the thickness of the base, which carries the thread; then replace the cap and bore a hole, just large enough to take an ordinary brass pin, through the cover and the base. Unscrew the cover, and enlarge the inner part of the hole, in both base and cover, so as to take a lock pin made of wire, about ⅛ in. in diameter. The lock pin should work quite freely in this hole. Now insert the lock pin in the base and hold it in place with a piece of paper or a key, until the cover is screwed on. After the cover is screwed clear into place, the lock pin will drop, preventing the cover from again being removed until the lock pin is released by upward pressure of a common pin through the small hole.



Renewing Old Electricians' Tape

Electricians' tape which has been used, or has dried, can have its stickiness restored by immersing in strong hot soapsuds, and leaving until the solution has penetrated. It is then taken out and hung up to dry, being rolled up as soon as it reaches the required stage of "stickiness."—Fred C. David, St. Joseph, Mo.

Using Soft-Coal Screenings with Anthracite

The following idea may be of benefit to many householders who have only a small amount of anthracite on hand:

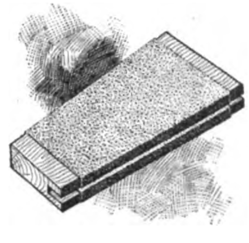
First, secure a load or two of soft-coal screenings, No. 1 grade if possible. Second, sift all the refuse from cooking stove and furnace, and after picking out the slate and clinkers, mix an equal amount of the screenings with the sifted cinders (not the fine ash), and use the mixture in the furnace. If the soft coal is a noncaking fuel, it will neither harden over nor clinker, and practically all the anthracite as well as the screenings will be consumed; furthermore it will give a lasting fire.

Using cinders alone with anthracite makes a dirty fire with lots of clinkers, and I have found from experience that when cinders are used with anthracite alone, it requires quite a few siftings to consume even the first cinders used. No doubt this is the reason for the great waste of cinders in private houses. The mixture of cinders and screenings makes a great deal less smoke than the best grade of soft-coal lump. This is no doubt due to the fact that the anthracite cinders are of practically the same composition as coke; that is to say, nearly pure carbon.—James E. Noble, Portsmouth, Ont.

Breastplate for Brace and Bit

When using a brace and bit, or a hand drill, on a job which requires considerable pressure, a large surface by which the pressure can be applied will make the job much easier. The end of a common tin can, nailed to a round wooden disk about 10 in. in diameter, forms a handy device for this purpose. By placing the end of the brace inside of the can and the disk against the operator's body, considerable pressure is applied quite easily.—A. M. Fairfield, St. Marys, Kan.

Sandpaper Held Firmly on Block by Its Tapered Shape



A neat form of sandpaper block has its two sides slightly out of parallel, one of them having a slot into which the edges of the piece of sandpaper are folded. The paper will be clamped quite tightly by pushing it toward the larger end of the block, or instantly released by pulling it toward the small end. In using the block, if it is held with the small end toward the workman, the index finger resting on the large end, there will be no tendency of the paper to slip out of place. Blocks embodying this principle can, of course, be made of various shapes, and with corners curved off to any radius to fit fillets in the wood to be sanded.—Henry Wedde, Chicago, Illinois.

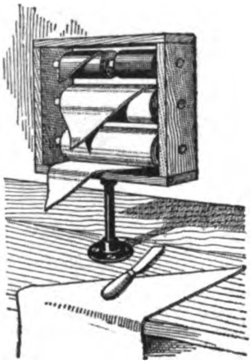
Using a Barrel as a Mouse Trap

When difficulty is encountered in ridding a place of mice by the ordinary methods, try this one: Get a fairly tight barrel and bore a hole near the bottom to serve as an entrance. Throw into the barrel a quantity of shavings, or any material that would be useful to the mice in forming nests. Add some grain to serve as an additional attraction, and then cover with a piece of wood. Let the barrel remain in a place infested with mice for a week or ten days. At the end of this time numbers of the creatures will have taken up their abode in the barrel, and be busy nest making. Then stop up the hole in the bottom with a cork or wood plug of proper size, lift up the cover of the barrel a little, and pour in water until there is sufficient to drown the occupants. The trap may be emptied and, after drying, set up again. In this way a locality is soon cleared of mice.—S. Leonard Bastin, Bournemouth, Eng.

Pinch Bar Made from Buggy Axle

When an old buggy is thrown on the scrap heap, its axle can be made by any blacksmith into a handy and durable pinch bar or crowbar. The size and weight of the axle make it well adapted to this purpose.

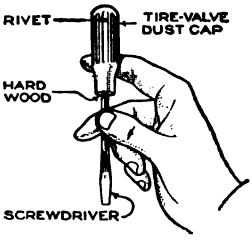
Convenient Rack for Rubber Gum and Fabric



Vulcanizers will find this rack convenient and practical. It keeps the repair stock clean, and permits several men to work at the same table without interfering with each other. The wooden frame, made to hold several rolls of gum and fabric, revolves on a stand fastened to the table. It can be turned in any direction, to accommodate workmen at the opposite ends of the table. The frame is of lumber, 4 in. wide, with holes bored through the sides to hold the rolls. The rack revolves on a piece of half-inch pipe, threaded on one end to fit a flange, which is screwed to the center of the table. On the bottom of the rack another flange is screwed, in which the pipe should turn easily.

On the ends of the rack may be hung knives, rollers, stitchers, scissors, etc., thus keeping the table clear of working tools and allowing more table space. The entire contrivance is so simple that any vulcanizer can easily construct one.

Screwdriver Handle Made of Dust Cap from Tire Valve

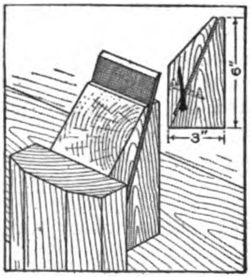


An ideal screwdriver handle is made from an old dust cap, such as used on automobile tire valves. A piece of hard wood is driven into the cap as tightly as possible, a rivet is then driven through, near the upper end, to prevent the wood from turning in the cap, and a hole is drilled in the wood at the open end, somewhat smaller than the round rod which forms the blade. The latter, which may be a piece of drill rod $\frac{1}{8}$ to $\frac{5}{16}$ in. in diameter, should be beveled off to a chisel edge, driven into the handle, and then ground to the proper shape for use as a screwdriver. The dust cap forms a durable handle and ferrule in one piece, and has the additional advantage that it is of distinctive appearance, and is so made that a very firm grip can be taken upon it with the hand.

Partitioning Off a Room to Save Heat and Coal

In very cold weather, it may help greatly to save coal if the expedient is adopted of hanging curtains across a large room, so as to confine the heat of the stove or radiator to the part of the room actually required for use. The curtains may consist of blankets hung on a wire. A space of, say, two feet may be left between them and the ceiling for ventilation, without impairing greatly the efficiency as a coal saver.—Eric Warren, Corpus Christi, Tex.

Clamping Block for Filing Scraper Blades



Scraper blades are awkward to file, unless a special vise adapted for such work is at hand. If merely put into the ordinary vise it is necessary to let the blade stick out so far, in order to permit the file to be worked at the proper angle, that the blade bends at every stroke. This is not much bettered even by supporting it by one or two pieces of board, for though the blade then does not bend, the operation of clamping is made awkward, and the blade is still in a vertical position, which lends itself badly to the filing of a bevel.

The filing block shown in the illustration, made in a few minutes from scraps, grasps the blade firmly just back of the cutting edge and holds it in an inclined position, which makes it possible to hold the file level. It is made by simply ripping diagonally a block of 3 by 4-in. stock, beveling off the upper portion of the front piece, as shown, and connecting the two by countersunk screws, placed near the bottom end, which are screwed in tight enough to hold the scraper blade while filing.—Henry Simon, Laguna Beach, Calif.

Keeping Collapsible Tubes Inverted Prevents Contents Drying Out

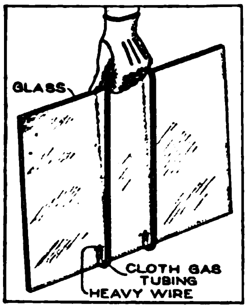
Paint, tooth paste, or other materials kept in collapsible tubes, will sometimes separate, and the oil will squeeze from the tube first, leaving the remaining substance dry. After each time of using, it will be more dry than before, and the last of it may be too dry to be squeezed from the tube. This occurs because the solid matter sinks to the bottom, and may be remedied by keeping the tube in an inverted position. To facilitate this, make a small hole in a wooden block, into which the cap of the tube can be pressed, the block serving as a base or holder for the tube. If the cap is sufficiently tight in the block, the latter will also be of use in unscrewing the cap.

Making Special Angles and Curves for Drafting Jobs

Draftsmen who often have occasion to draw certain curves or angles will save time and work by cutting their own irregular curves and angles out of sheet celluloid, fiber, or hard rubber, using a pattern of heavy paper pasted to the material as a guide, cutting with a scroll saw, and smoothing the edges with a fine file. Often a standard angle or curve can be altered very easily to the required pattern. —J. Horace Van Nice, Chicago, Ill.

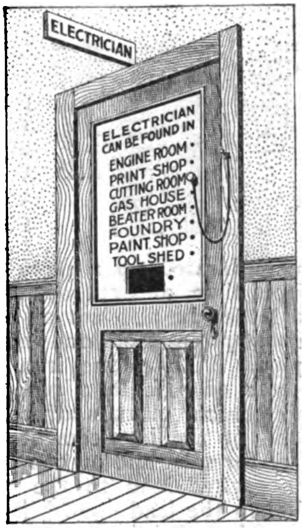
A Handy Wire Hook for Carrying Window Panes

Carrying a pane of glass is a job which, although apparently easy, causes much loss of temper. If the pane is wrapped with paper, there is often danger that it will slip out of the hand and fall. If it is not wrapped, the edges are likely to cut the hand. One who provides himself with an old glove, and a piece of stiff wire inside of a long, heavy cloth-covered rubber tubing, will find the difficulty practically solved. The wire is used as shown in the illustration, and the glass is held from tipping out by a slight pressure of the thumb.—Henry W. Kingston, Milwaukee, Wis.



Signboard Shows Where Workman is to be Found

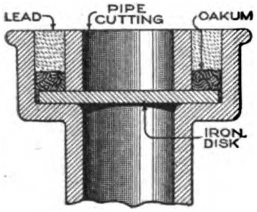
An electrician in a large mill installed on the door of his shop a signboard which saved much time for his fellow employes. When out working in the mill, his shop door was always left closed, and when electric trouble developed in a distant part of the mill, much time was often wasted in finding him. The device consisted simply of a wide board attached outside the shop door, having painted upon it the names of the various departments in the mill where electrical work frequently had to be done. In front of each was drilled a small hole in which could be inserted a plug hanging by a string from a nail in the door casing. When the electrician left his shop, he simply inserted the plug in the proper hole, which notified callers immediately of his whereabouts. Parties calling him by telephone and receiving no answer could call the department opposite his shop and inquire where the electrician was, the question being answered by a glance at the board on the door.



A small piece of slate was inserted in the board below the painted letters, and a plug hole was also made beside this slate. When going to a place not covered by the painted signs, the electrician noted this on the slate with a piece of chalk, and inserted the plug opposite it. The plug was provided with a conspicuous white head made of an old porcelain insulator, and was hung by a cord from a nail in the casing, near the door knob. Thus the door could not be opened without removing the plug from the hole, and there was no danger of the electrician returning without indicating it by removing the plug. This idea could be made use of by many tradesmen. — Frederic Doremus, Passaic, N. J.

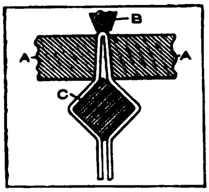
Closing Cast-Iron Pipe Ends without a Plug

When making some changes to a water system in a country town, it became necessary to cut out several lengths of 12-in. cast-iron pipe. The pipe ends on the remaining pipes therefore had to be plugged at once, and it developed that there were no plugs of proper size on hand. The foreman hunted up a piece of ¼-in. sheet-iron plate, and cut out several circles on a lathe; he also cut an equal number of short pieces from one end of the removed pipe. Placing the iron disk and short piece of pipe in a pipe hub, he calked in several strands of oakum, soaked in one of the iron-cement mixtures which are for sale, and on top of this he poured in melted lead to the top of the hub. When the lead cooled, it was well calked in. All the joints so made were found to be water-tight, and nearly as easy to remove as the regular plugs. This was done by cutting out the short pipe ends with a hammer and cold chisel. No trouble was experienced with ends splitting from the pressure caused by the lead calking, nor did the joint leak through the oakum.



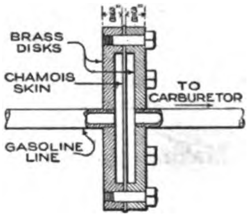
Compressing Spring Wire While Bending Preserves Strength

In making forming dies for bending spring brass wire, it is usually found impractical to bend the wire to a very short radius, because the wire either breaks at this point during the forming, or is so weakened that it breaks afterward, while in use. Very successful results in the way of bending wire to a short radius have been obtained by compressing the bend at the time it is being made, so that the wire is shortened, rather than lengthened, and the metal is made more compact. In the example illustrated, brass wire is being formed into a garter, and the bend is compressed by the jaws A, and forced with considerable pressure against the fixed pin B. The work is prevented from slipping away from B by being bent around the square form C. A wire garter formed in this way was used steadily for two years, without breaking, showing that the wire at the sharp bend had not been appreciably weakened.



Chamois-Skin Gasoline Filter Avoids Carburetor Troubles

A permanent filter in the gasoline line of an automobile will tend to minimize sediment and water in the gasoline supply. Two brass disks, a circular piece of chamois, and two brass screws are all that is needed. The disks are cut to 3½-in. outside diameter, and recessed out on the inside to about 2½ in. in diameter. The depth of the recess need not be more than ⅛ in. in each disk. This filter, if kept clean and tight, is a positive assurance against water and dirt getting in the carburetor.—Peter J. M. Clute, Schenectady, N. Y.

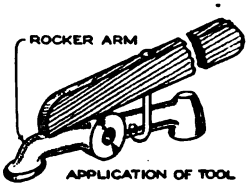


Lubricated Varnish Eliminates Trouble with Sliding Drawers

To make bureau drawers and other wood surfaces slide easier, add a tablespoonful of powdered graphite to a pint of shellac varnish; stir well to mix it, and apply with a brush; dry 4 to 10 hours before using. One coat is usually enough. —E. L. Howard, Springfield, Ohio.

Tool for Lifting Rocker Arms on Overhead-Valve Engines

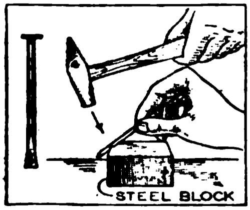
A very convenient tool for releasing the push rods on overhead-valve engines is shown in the sketch. The tool is made from a piece of hard wood, or metal, with a round rod riveted securely and bent as shown. By pulling upon the lever, the valve is moved downward, compressing the spring until the rear end of the rocker is clear of the push rod, which is then removed.—Charles Stuart, Dallas, Texas.



Renewing Enlarged Orifice in Burner

The burner orifice on a blowtorch became so enlarged that it would not burn with a hot blue flame, but with a sooty yellow flame, with raw gasoline spurting out at times. It was impossible to obtain another burner. As a temporary repair, the needle valve was removed, and the flame tube turned off with a pipe wrench. With a ball-peen machinists' hammer, several light blows were struck on the soft bronze burner, which completely closed the orifice. The needle valve was turned back in place just tight enough to pierce through the bronze, making a new orifice much smaller than before. After reassembling the torch it burned perfectly. It has been in daily use for a month since and continues to work well. When the burner becomes enlarged again, the repairing process can be repeated.—John P. Robinson, Hillsdale, Mich.

Preventing Nails from Splitting Wood

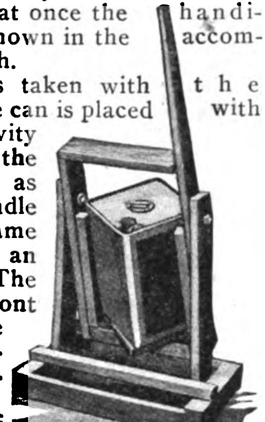


When nails have to be driven into a piece of wood which is so thin or narrow that there is danger of splitting, this danger may be much reduced by providing nails with a chisel point such as is used on railroad spikes. To avoid splitting ties, a railroad spike always has a chisel edge and is used with this chisel edge laid parallel to the rails, or across the grain of the tie. Small nails may be sharpened this way by laying them on the sharp edge of an anvil, or other heavy steel block, and striking a heavy blow with a hammer, which will cut off the old point of the nail, and flatten the end to the shape desired. If the flattened end is too wide, it may be dressed off with a file.—Walter L. Morrison, Crozier, N. Mex.

Desk Drawers Made of Bread Pans

In remodeling an office desk, new drawers were made of ordinary bread pans. One end was finished off flush by means of a wooden wedge, to which a face-board and handle were attached. Such drawers slide easily, being supported by the rim of the pan, and are not difficult to keep clean.—E. O. Tetzlaff, Cicero, Ill.

Frame Holds Oilcan and Tilts for Pouring

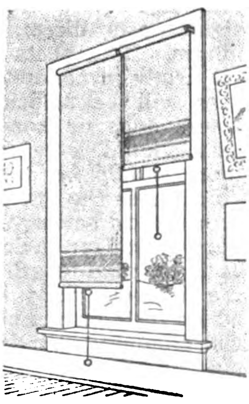


Anyone who has tried to pour oil from a square can, especially when the can is full, will recognize at once the handiness of the frame shown in the accompanying photograph.

The picture was taken with the frame tilted, but the can is placed with its center of gravity slightly back of the fulcrum, so that as soon as the handle is released, the frame swings back into an upright position. The piece across the front prevents the frame from swinging beyond the perpendicular position.

By the use of this arrangement, one may hold a receptacle in the left hand close to the spout, tilt the frame with the right hand, and pour as fast or slowly as desired without danger of spilling oil on the floor. Various methods of clamping the can will occur to the maker, to prevent it from slipping out when nearly empty and turned almost upside down.—Harvey Mead, Scranton, Pa.

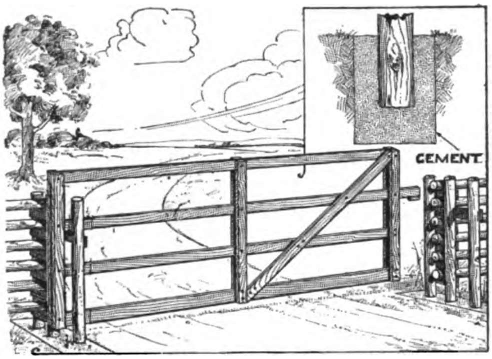
Divided Window Shades Permit Fine Adjustment of Light



The device of using two shades, side by side, on a wide window, instead of one, is useful in a number of places; especially in the sick room it will often allow sunlight to enter a room from which it would otherwise be excluded because it might shine too directly on the patient's eyes. In many shops and drafting rooms, also, the device will pay for itself in the convenience which it brings. When both shades are to be raised or lowered at once, no extra time is required, as one hand can be used on each shade.—R. Lee Sharpe, Carrollton, Ga.

A Durable Hingeless Field Gate

All field gates should be made higher than the fence, because restless animals try the gate in preference to the fence.



A Gate Which Requires No Hinges, cannot Sag, and is Easily Swung Open or Closed

Where the gate does not have to be opened very often, the sketch shows a construction which is more durable and often more convenient than hinges. To open this gate, the end at the right is lifted from the bar between the two posts, on which it rests, and is slid along, resting on the cross bar at the other end of the gate, until the cleat across the center of the gate touches this cross bar. The gate is then almost balanced or supported at its center and can be swung around at right angles with very little exertion. This cross bar, on which it is swung, is securely fastened to two posts set at an angle of 45°, as shown.

Any shocks which may come to the gate structure, such as by animals running against it, are taken by these upright posts direct, instead of through hinges. The posts should therefore be set firmly in concrete. A gate with four bars will be sufficient for dairy cows; where hogs or horses are pastured, the gate should have five bars. For hogs, there should be a pole or bar of some kind under the gate, partly buried in the ground, or better, a sill of cement. A good width for such a gate is 14 ft. clear, or 15 ft. total length of gate. A block, at the extreme right end of the gate bar which rests on the bar between the posts, will eliminate any danger of the gate being pushed open by animals.—Herbert A. Shearer, Chicago, Ill.

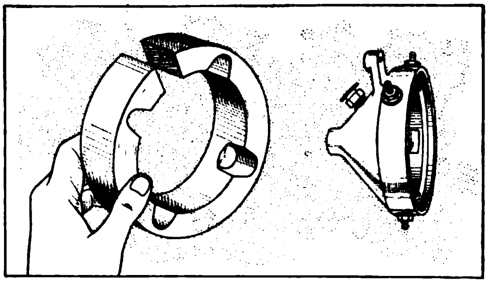
ℭTo prevent a round-head bolt from turning in wood or metal, drive a prick punch, close to the edge, through the head and hold the punch while turning the nut.

Grooved Pulley Made of Barrel Heads

It was desired to drive a small emery wheel by a round belt from the flywheel of a gasoline engine, whose speed was only about one-eighth of the speed desired for the emery wheel. A large sheave was, therefore, required for attachment to the flywheel. To make this sheave, two 16-in. barrel heads were used, placing them together so that the beveled edges flared outward, and the grain of the two pieces was at right angles to each other. The two barrel heads were fastened together firmly with glue and screws, and were clipped to the arms of the flywheel, a large hole being made in the center of the sheave for the engine shaft and governor. The sheave was centered by measuring, and making equal, distances from several points on the edge of the sheave to the outer circumference of the flywheel.

Chuck Holds Auto Timers for Refinishing

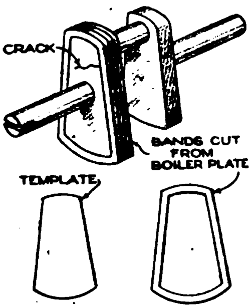
The inner surface on automobile timers wears quite rapidly, and after the car has run 3,000 or 4,000 miles, it is often so uneven that the roller does not make good contact, but jumps from one high spot to the next, causing the engine to miss fire. These timers are not expensive, and are often thrown away without any attempt to resurface the part, largely because the terminal screws on the timer case make it a difficult object to hold in the lathe chuck. Confronted, however, with the present scarcity of materials and parts, one shop has made from cast iron a jig, or special chuck, into which the timer fits, the jig being then held in the lathe chuck. The slot in the piece of iron gives it sufficient elasticity to grip the timer firmly when screwed up in the chuck. A universal chuck must not be



Rather Than Throw Away a Number of Worn Automobile Timers, It will Conserve Material if They are Placed in a Jig, Such as This One, and Resurfaced in the Lathe used, because the outer surface of the timer varies considerably; the part must be centered with reference to the metal contact surface under the terminal screws.

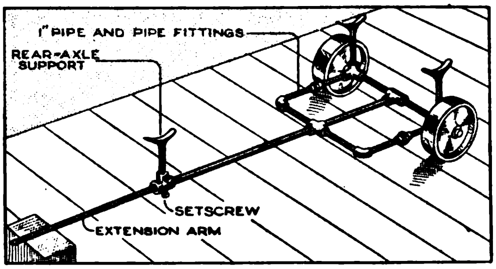
Emergency Repair for a Crankshaft with a Cracked Web

The crankshaft of one of the pumping engines on a ship was found to have developed a crack in its web, which prevented proper working of the engine, and threatened to put it out of service altogether. As it was hardly possible to get a new crankshaft at the time, a repair was made by this method: A template was cut, the exact shape of the web of the crankshaft, except that it was 1/64 in. shorter. By means of this template, three bands were cut, out of ½-in. boiler plate, of the shape shown. The inside surfaces of these bands were fitted closely to the template by filing. The crankshaft was then placed in a vertical position, a hole being drilled through the web at the end of the crack to prevent it from extending farther, and the bands, heated red-hot, were slipped over the web. When cool, they bound the defective web together with tremendous pressure, and enabled the crankshaft to be put back into service. The crack was found to have been caused by the bearings being somewhat out of line, and after this condition was corrected, the engine ran satisfactorily, in spite of the extra weight on the crankshaft.



Loading Truck Facilitates Handling of Auto Chassis

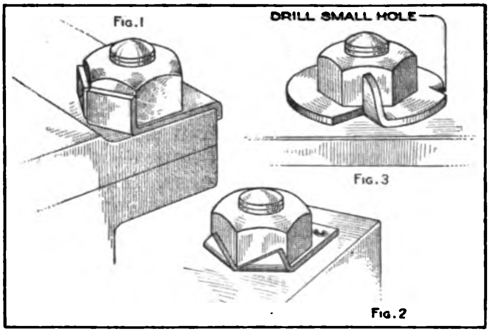
When loading automobile chassis on freight cars considerable twisting and prying is usually necessary to get them in through the narrow doors. To simplify this operation, a truck, as shown in the sketch, was devised. It consists of two heavy metal wheels attached to a substantial axle, and a tubular extension carrying three supports. The supports are so arranged that they fit onto a convenient part of the front axle and hold the chassis from slipping sideways. The third support engages the differential of the car. In operation, the truck is wheeled about by means of the extension handle.



Auto Chassis, Which Are Heaviest at the Front End, are Readily Handled with This Truck

Easily Made Lock Washers

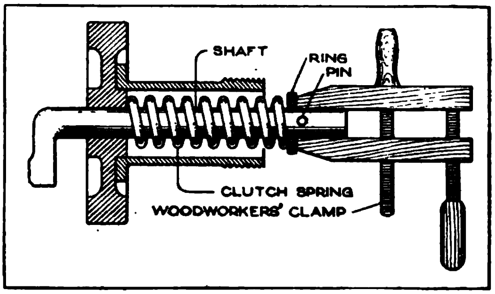
These three types of lock washers are the invention of a practical mechanic; each of them has been tested and found efficient. They have the advantage of being both cheap and easy to make. In Fig. 1, the washer is cut oblong, the hole is drilled in the center, and one end is split and spread. This washer is slipped on, and the two tabs are bent up against the flat sides of the nut, while the other end is bent downward over the edge of the part held. Fig. 2 shows a common square washer, made of 1/16-in. sheet iron. When washer and nut have been tightened down, a prick punch is driven into two corners, and the other two corners are bent up against the flats. Fig. 3 is a common round washer, slotted as shown with a hacksaw. A small hole is drilled in the work in any place at the edge of the washer, and a section of the washer is drifted into this hole. The larger lug is turned up at right angles, so that it bears against the nut.



Three Types of Lock Washer Which are Easily Made and Useful in Machinery Which is Subject to Vibration

Compressing Stiff Clutch Springs with Woodworkers' Clamp

A woodworking clamp is a good tool for removing and replacing the clutch springs on automobiles. The clamp jaws are simply tightened on the shaft, with the ends bearing against the ring, or collar, which retains the spring in position. The clamp is driven on with a hammer, compressing the spring until the retaining pin can be removed or replaced, as desired. The advantage of the clamp method is its adaptability to different sizes of shafts. Often, too, awkward places, in which springs are difficult to compress, can be easily reached by the protruding ends of the clamp jaws.—G. A. Luers, Washington, D. C.



A Woodworkers' Clamp, Driven On with a Hammer, Compresses the Clutch Spring, So as to Extract or Replace the Pin

Fuel-Saving Kinks Valuable in the Home

If the fire box of the stove is partly filled with bricks or stone, leaving the center for the coal, a fire can be made with less coal, which will have more heating ability than it would have without the bricks or stone to absorb the heat.

Too much heat in a home, that is to say, any temperature above 68°, the point which has been set by the Fuel Administration as a proper room temperature, tends to produce something which dangerously approaches laziness. This is felt plainly when the temperature runs up to 75 or 80°, but is present even at 72 degrees.

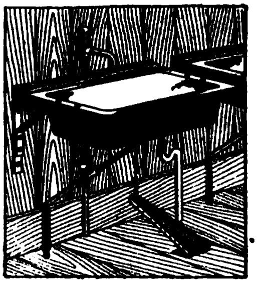
Fires in bedrooms are unnecessary. A bed can be warmed before retiring, if absolutely necessary, by hot water in a bottle or jug, or by an electric-light bed warmer, and this will be found after use to be even more luxurious than a heated bedroom, and decidedly more sanitary and economical.

When the fire has died out and the room is beginning to get chilly, if one must still sit in it, place a kerosene lamp under the chair and it will save the necessity of firing up again.—B. W. Rice, Caldwell, Idaho.

Pedal Switch for Emery-Wheel Motors

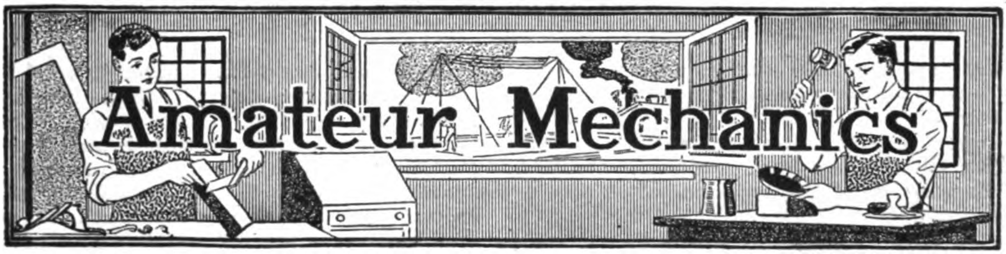
Emery wheels do not take a great deal of power, but when it is considered that they often run all day, while the total time during which they are actually used does not amount to more than perhaps half an hour, it will be seen that a considerable waste of energy is involved. One way to reduce this is to install a pedal control for the switch or belt shifter, together with a spring, so that the switch will be opened or the band shifted back to the loose pulley by the action of the spring, as soon as the tension on the pedal is released. It may, of course, be objected that a workman would have to wait a few seconds while the wheel was reaching its full speed, thus losing time, but in many cases, this time can be fully occupied in examining the tool to be ground, and determining the exact angle at which it is to be held.

Foot Control Handy for Faucets in Washbowls



Foot control for the wash basin is recognized as the most convenient and sanitary method, and its adoption would be much wider than it is, if its advantages were better known. It will contribute wonderfully to the cleanliness and convenience of the shop washbowl, if a pedal is installed so that pressure, applied to it with the foot, turns on the water, it being turned off by a spring, when the foot is removed. In this way, the convenience of a steady stream of water is secured, while at the same time all danger of the water being left turned on by a careless person is eliminated.

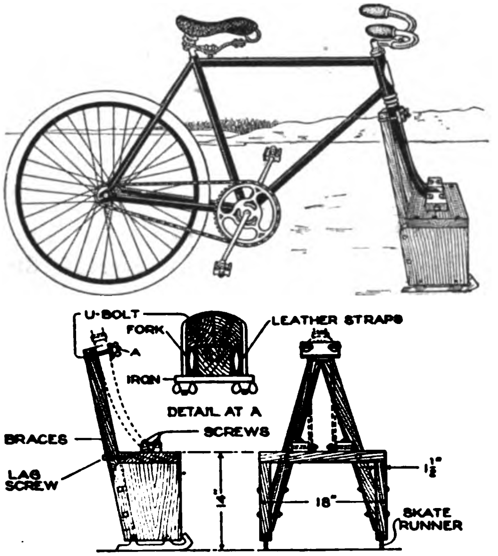
¶Time can be saved in photographic work by making a mark on the bottle, to indicate the amount of hypo, or other material, usually weighed out in making solutions.



A Bicycle Ice Speeder

By F. E. BRIMMER

An ordinary bicycle, with the front wheel removed and a purposely built sled attached in its place to the front forks, makes a combination that will compete in speed with anything that travels on ice. It must, of course, be carefully constructed and used with due regard to its limitations. When these are learned, however, a great deal of fun can be obtained where a large ice surface is available.



Two Old Skates and Some Scraps of Lumber, with a Few Screws and Boards, will Convert Any Bicycle into an Ice Speeder Which will Travel with Astonishing Velocity across a Frozen Lake or along a River

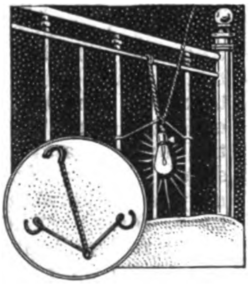
The sled need not be heavy if properly built. The fork is fastened directly by two bolts to wooden blocks, which are in turn firmly attached by screws to a horizontal board, 18 in. long and about 7 in. wide. The ends of this board are screwed to two shorter pieces of 1-in. hard wood, whose height depends on the diameter of the bicycle wheels. If the ordinary bicycle with 28-in. wheels is used, these boards will be about 12 in. long, so that the runners and the top of the board will make the height of the front hub the same as that of the rear one, or nearly 14 in. The runners are simply two old skates, with the tops removed. The runners are sunk into slots in the wood, and fastened with nails passing through the wood. Care should be taken to see that the skate runners are accurately placed, with their edges exactly parallel with each other and with the edge of the board in which they are fastened.

Two braces, of sticks about 1½ in. square, are run from the top of the forks to the vertical boards which form the sides of the sled. By arranging them as shown in the sketch, they will act not only to brace the sled against swinging back if a stone or rough place on the ice should be encountered, which is, of course, their main purpose, but also to strengthen the sled itself against collapse. At their upper ends, these braces are firmly attached to the forks by a piece of iron rod, which is bent to a U-shape, threaded on both ends and sunk into the braces, and a small block which is placed between the forks. The metal forks should be protected against damage by inserting two small pieces of leather, as indicated; nothing but this leather will then come in contact with the finished metal. The size of the block should be made so that the forks will be gripped firmly but not tightly enough to injure them; the thrust from the sled is not taken by the friction of these straps, but by the pressure of the small block between the forks.

The speeder is propelled, of course, like an ordinary bicycle. If the rear tire slips too badly, it will be necessary to wind the tire and rim with wire, in order to provide traction. This will not be necessary, however, if the tire is nearly new and has a nonskid-type tread with projections on the rubber. One characteristic of the construction may cause a fall unless it is understood at the start; namely, that, on account of the angle at which the front steering spindle of a bicycle is set, the speeder will have a tendency to lean outward, instead of inward, when rounding a curve. This tendency can be corrected, of course, by the rider leaning strongly toward the inside of the curve, as he does to some extent when riding an ordinary bicycle. The question will occur as to why two runners are necessary instead of one, corresponding to the front wheel. It is indeed possible to build a machine in this way, and it will be in some respects more satisfactory than when built with the two runners 18 in. apart; it will be found to steer somewhat easier at high speeds and will, in fact, be safer when traveling at high speeds. For the beginner, however, who should confine his efforts at first to mastering the peculiarities of this novel vehicle at low speeds, it is better to start out with a double-runner sled in front.

It should be noted, in conclusion, that, unlike many freak devices made for bicycles, this does not prevent, in any way, its usefulness for ordinary purposes. By removing two nuts, loosening the two wing nuts, and sliding the forks out from the U-bolt, the front wheel may be replaced in a few minutes, and the bicycle is ready to ride.

Handy Electric Night Lamp for Emergencies



A handy bracket for an electric light on the bed may be made from heavy wire, twisted together for a length of about 15 in. At one end a hook is made, to fit over the top rail of the bed. At the other end, the two wires are spread out each way and bent back at an angle, so that the two free ends will span two or more of the upright rods in the head of the bed. The two ends of these curved pieces of wire are bent to form hooks. A wire loop is soldered at the place where the three legs of the holder come together, this loop serving to pass the lamp cord through, and hold the light. The hooks are padded so they will not injure the finish on the bed, and the whole apparatus is hung on the head of the bed, as shown, providing a handy night light within convenient reach.—G. I. Mitchell, Ruston, La.

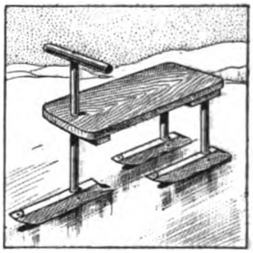
An Error Corrected

On page 628 of our October issue appeared an article entitled "Converting a Safe-Cabinet into a Safe." The use of the words "Safe-Cabinet" here was an error, as the process was intended to refer rather to the ordinary steel filing cabinets than to the particular product known as the "Safe-Cabinet," which is primarily a safe and not a filing cabinet.

Kitchen Chair as a Back Rest for Invalids

Many persons confined to their beds are able to sit up in bed, but refrain from doing so owing to the strain the back must bear. This can be relieved by the use of an old kitchen chair, with the legs cut off close to the seat. The seat and the back can be covered with some kind of padding. When the patient wishes to sit up, the seat can then be slipped under him.—Gustave Schoeffler, Rahway, N. J.

Steering Sled for the Small Boy or Girl



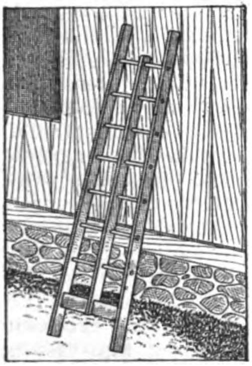
For the youngster who is not quite old enough to enjoy safely coasting on an ordinary sled, the three-runner affair illustrated will be a welcome toy. The sled is hardly suitable for coasting on hills, unless they are very gradual, but can be propelled nicely over hard snow on the sidewalk by the little one's feet. The length of the sled illustrated is 18 in. and the width 5 in. The seat is made of 1-in. pine, and the posts are pieces of old broom handle; the height should be such that the child's feet reach comfortably to the ground. A large nail through the steering post carries the weight in front, bearing against a large washer on the underside of the seat. The runners are of 1-in. ash, with steel shoes.

Teeth on Back of Saw for Cutting Nails

On the back of the saw, at the end away from the handle, file a row of teeth about 6 in. long. They will be found very convenient for cutting off nails, especially while removing old casings.

Central Beam Doubles Safety of Ladder

A ladder combining to an unusual degree the factors of strength, safety, and light weight can be made by interposing a central upright between the two sidepieces. This neither complicates the construction, nor does it add much to the cost, since relatively smaller timbers can be used. That is to say, a three-beam ladder is lighter than an equally strong ladder of the ordinary type.



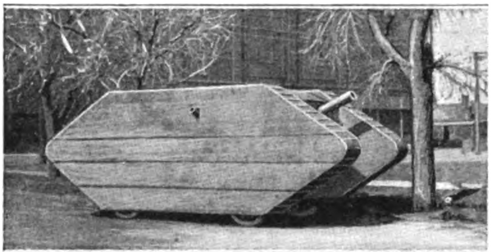
In constructing the ladder, it is well to make the bottom rung of flat stock, and to mortise it into the end of the central beam. The three uprights can be clamped together and bored for the rungs all at once, since in this form of ladder it is not necessary to make the rungs thicker in the middle than at the ends. All the holes should make a tight fit. The third piece can be driven into place by greasing the rungs with paraffin, which, however, should be carefully removed later on, with sand paper.

The third piece binds all rungs together at exactly the point where the strain is greatest and rungs most often break; even if one-half of a rung should give way under one foot, the other foot would still be safe on the other half.

It will be found also that, far from being a hindrance in working, the central upright will rather prove an added convenience. It does not interfere at all with either hands or feet in climbing, but instead prevents sidewise slipping of the feet. A pail can be hung quite handily, without slipping, between the center beam and either of the side beams.—Henry Simon, Laguna Beach, Calif.

Building an Imitation Battle Tank for Use in Parades

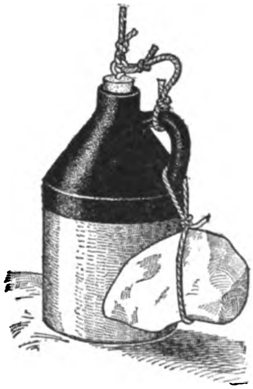
In many Liberty-loan parades the feature of interest has been an imitation battle tank. These are inexpensive, and simple of construction. The tank which is here illustrated was made of ordinary roofing paper, over a frame of 1 by 4-in. and 2 by 4-in. boards, the latter used as braces. The whole was mounted on an ordinary light roadster, which furnished the motive power. One brace in the back was removable for driving the car inside the framework, a few simple knots were then tied, and the imitation battle monster was ready to go. The entire cost, exclusive of gasoline and wear and tear on the car, need not exceed $20.



A Tank, Made of a Light Wooden Framework Covered with Roofing Paper, Presents a Formidable Appearance in Any Patriotic Parade

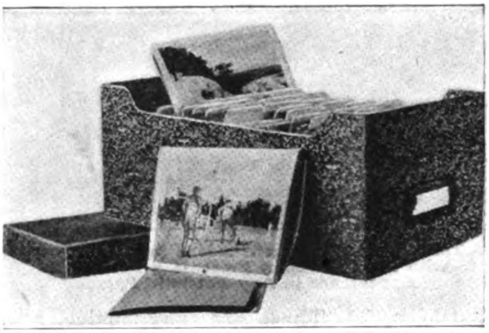
Cold Water Drawn from Bottom of Lake or Stream

Recognizing the fact that the water at the bottom of a lake or river is colder and cleaner than the surface water, a camper recently used the following device: Fasten a piece of cord to the handle of an old jug, and also to the cork, as in the illustration. Then fasten a stone or weight of some kind, so that the jug will sink easily. Lower the jug to the bottom of the lake; when it touches the bottom give the cord a quick jerk, thus pulling out the cork. When air bubbles cease coming to the surface, it will show that the jug is full, and it is then raised by the cord.—Clay Hewes, Albany, N. Y.



Filing Prints and Negatives in Card Cabinet

Amateur photographers, who take any considerable quantity of pictures, usually find that the job of keeping the negatives and prints in such shape that they can be found when wanted, is one which is decidedly worthy of attention. Probably no better way of keeping the negatives and prints can be found than to use a standard card cabinet with guides between different lots of prints or negatives. Cabinets, or trays, made of heavy pasteboard, are obtainable at very moderate prices; a certain number of guides are usually furnished with them, and others can be readily purchased or cut from pasteboard. The negatives may be filed by date or by subject, or both; in any case, the wording written on the guides should be such as to identify instantly the pictures filed behind it. One of three sizes of card cabinets in general use, namely, 3 by 5 in., 4 by 6 in., and 5 by 8 in., will be found suitable for any size of photograph in common use among amateurs.—E. C. Blomeyer, Waco, Tex.



A Standard Card Cabinet with Guides and Follow Blocks can be Put to Good Use in Filing Photograph Negatives and Prints for Ready Reference

A Novel Pencil Holder

An old fountain pen makes a novel pencil holder, and uses up small pieces of pencil which might otherwise be wasted. Remove the cap in which the pen is held, and screw the pencil stub in its place. The threads will hold the pencil firmly.

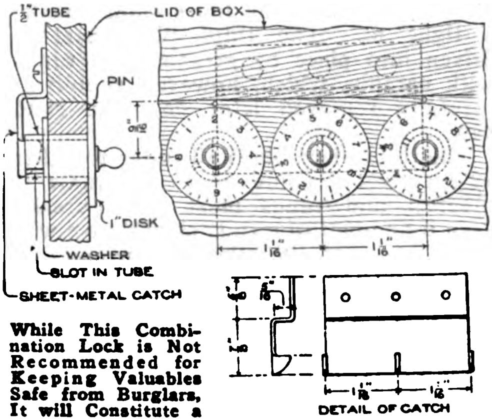
An Inkless Pen

To make a pen that will write without ink, get a small quantity of violet aniline from a drug store, and some gum arabic. Dissolve a little of the gum in warm water, and mix with the violet aniline until a paste is formed. Apply it to the inside hollow of a new pen, just above the split. To write with the inkless pen it is only necessary to dip it in water. Shake away the drops, but do not wipe the pen. After a few moments it will be possible to write quite well. Such inkless pens last for a considerable time, and may always be renewed.

Simple Combination Lock for Chests and Drawers

There are in this lock three cylinders, each of which engage the catch, and the three must release simultaneously to enable the box to be opened. Each cylinder is made of a piece of ½-in. tubing, ¼ in. longer than the thickness of the box. A metal disk, or button, 1 in. in diameter, is soldered or brazed to one end. The wall of the tubing is slotted for ¼ in. at the other end, the slot being just wide enough to accommodate the projections on the catch. Three ½-in. holes are then bored in the box, and the cylinders are inserted; metal washers are fitted over the tubing inside the box, and soldered, to hold the cylinders in place.

The catch is cut out of sheet metal, and bent to the shape shown in the diagram. Care should be taken to have the projections correctly spaced, so that all three will enter the slots in the cylinders at the same time. Before attaching the catch permanently, it is well to decide on the combination to be used. Stamp the figures on the disks, and see that the lock works well when the correct figures are set at the marking pins. The catch may then be screwed tight to the lid, and the lock is complete.—Kenneth E. Ernst, New York City.



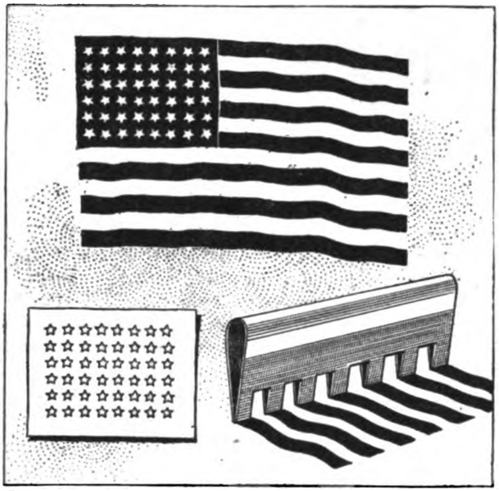
While This Combination Lock is Not Recommended for Keeping Valuables Safe from Burglars, It will Constitute a Serious Hint That the Box is Not Intended to be Opened by Anyone Not Knowing the Combination

Drawing a Flag with Graceful Waves

By R. J. STEPHENS

KEEPING the flag constantly before us may serve as a reminder of the fact that our country is now engaged in a struggle, which calls for each one to do his part, not only at special times, such as when Liberty bonds are issued, but every day, when we eat, when we buy clothes, and when we have leisure time.

The American flag, while undoubtedly one of the most beautiful and significant, is more difficult to draw than most other important national flags. It can, however, be drawn quite easily and quickly by means of the ruling pen illustrated. This consists of a strip of tin, such as can be cut from a tin can, with six rectangular slots cut in each side, the piece being then folded over to the shape shown. By filling the space between the projections with red ink, the seven red stripes of the flag may be drawn, either straight or with curves to represent a waving flag. In using it, the paper should be placed on several thicknesses of soft blotting paper, to compensate for inaccuracy in cutting the tin. Another piece of paper should be placed over the space which is to contain the field of stars, and the stripes are then drawn directly over this piece, and over the striped portion of the flag.



The Stripes in the Flag are Drawn with a Special Ruling Pen Made of Tin, and the Stars are Made by Stenciling

For making the stars, a stencil is required; the stars should be cut in a piece of strong paper of the proper size. If a ticket punch made to punch five-pointed stars is available, the job can be done very quickly, and stencils of various sizes and with different forms of "wave" can be readily produced. Otherwise, some careful work with a pocketknife will be required. Having made the stencil, lay it in place on the flag, and rub over it with a lump of paraffin, such as is used in canning fruit. The paraffin works best when warmed very slightly; if the job is well done, each star will be clearly "printed" in paraffin on the paper. Now dip a paintbrush in blue ink, and paint over the whole field of stars. When the ink has become entirely dry, scrape off the paraffin with a sharp knife, bearing very gently in order not to scratch the ink, and the star field is finished. A flagstaff is easily added with a pen or pencil and ruler.

Another method of making the stars is by the use of white ink on a brush, working with the stencil, on a field which has been colored solid blue. A white ink of good quality, preferably the kind sold in solid form, will be required in order to obtain the best success in making the stars with this method.

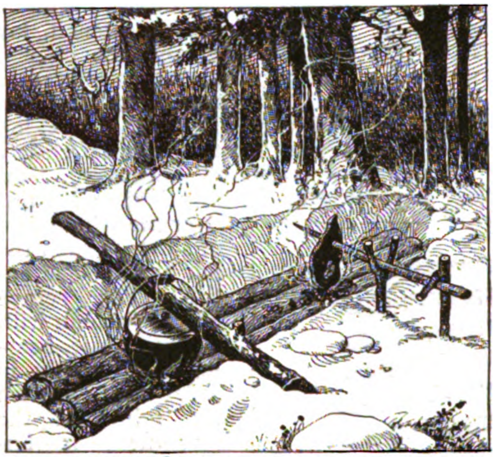
Unless star stencils are made which suggest waves in the flag, the waves in the rest of the flag will of course have to be almost entirely confined to the portion having the full 13 stripes. If the ruling pen is tastefully used, however, this limitation will be scarcely noticeable.

Holding a Hand Camera at Eye Level

It is a common complaint against hand-camera work that, in so many cases, the viewpoint is too low, the lens being at about waist level. Hence, all sorts of trouble—patches of sky coming down into the picture, heads coinciding with the sky line, and so on. Many hand cameras cannot be used at eye level without some alteration, owing to the position of the finder. But it is often possible to fix a little cap over the finder, containing a scrap of looking-glass at an angle of 45°, so that, on looking along the top of the camera, the view in the finder can be seen reflected in the mirror. The device should be removable, to permit ordinary use of the camera, and the hood may be prolonged for, say, an inch behind the finder. This cuts off a great deal of extraneous light, so that the image can be seen clearly.

How to Build a Camp Fire in Deep Snow

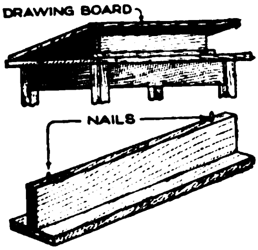
The illustration shows a quick and efficient way to make a fireplace in the snow,



Building a Camp Fire in a Snowdrift Is Easy Enough if One Knows How to Do It. The Long Sticks Keep the Fire from Sinking

that is more convenient in some ways than a camp fire on the ground. First a trench, 5 ft. long and 16 in. wide, is made by scooping up the snow, with snowshoe or shovel. The bottom can be secured against sinking when the snow melts by laying green poles, 10 ft. long, lengthwise in the trench. A stick extends across the trench, upon which the kettle hangs for boiling. A stick supported on two others thrust into the snow will support meat, corn, etc., for broiling over the fire. If possible, the trench in the snow should be made along the side of a cabin, fence. row of trees, or other object, for breaking the wind.—F. E. Brimmer, Dalton, N. Y.

Simple Support Adjusts Drawing Board on Table



Piling books, or other articles, under a drawing board on a table is, at best, an unsatisfactory method of holding it at the angle desired. Ten minutes' work applied to two sticks of wood will make the support shown in the sketch. Two pieces are nailed together, two nails driven in the vertical one, and the heads of these nails cut off; the nails are then filed to a very sharp point, so as to keep the drawing board from slipping. The angle at which the board rests can be varied by shifting the support backward and forward underneath it.—James E. Noble, Portsmouth, Ontario, Can.

Getting Fresh Air into a Stateroom

When riding in a hot, stuffy stateroom on a boat, the porthole of which does not admit much air, attach to the hinge of the porthole door, by means of a piece of string, a card or folded newspaper, so that it will deflect into the window the current of air formed by the ship's motion. A considerable "breeze" may be produced in this way.—Benjamin La Pish, South Bethlehem, Pa.

Small Washboard for Handkerchiefs Made of Spools

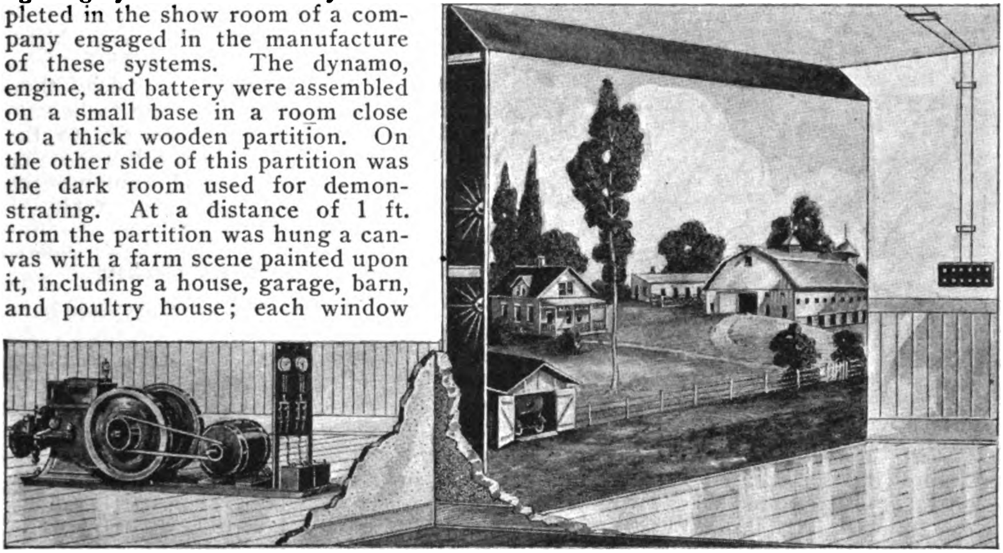
A small washboard suitable for washing handkerchiefs, or small pieces of lace or ribbon, is made by mounting a number of spools of the same size, on stiff steel wire or rods, in a suitable wooden frame. The spools on which silk thread is wound, having small flanges, are more suitable than those used for cotton thread. In laying out the frame, care must be taken that plenty of room is left for the expansion of the wooden spools, which occurs when they become soaked with water; otherwise, they will not work freely. This form of washboard will be found to entail a less amount of wear than the ordinary one, which involves rubbing against a rough surface.—A. S. Thomas, Amherstburg, Ontario, Can.

Screen and Storm-Door Hooks

To prevent furrows and holes in screen and storm doors caused by battering with the screw hooks, put the hook on the jamb and the eye on the door. Then the screw hook can do no damage. This will prevent the marring of the casing, which is due to the hook swinging outward as the door is closing. The changed position will not be found inconvenient.—W. J. Parks, LaSalle, Ill.

Electrical Model Shows Possibilities of Farm-Lighting Plant

A neat and effective demonstrating outfit to show the possibility of a farm-lighting system was recently completed in the show room of a company engaged in the manufacture of these systems. The dynamo, engine, and battery were assembled on a small base in a room close to a thick wooden partition. On the other side of this partition was the dark room used for demonstrating. At a distance of 1 ft. from the partition was hung a canvas with a farm scene painted upon it, including a house, garage, barn, and poultry house; each window was in reality a hole in the canvas, covered with thin tissue paper, behind which the light from a certain lamp could be seen. There were in all six lighting circuits, each one to illuminate a certain object in the picture; corresponding to these, there were six switches in a handy board, within reach of the salesman, as he stood in front of the canvas. The manner in which the different objects were successively lighted up as the salesman emphasized the particular advantages of lighting in this particular spot, formed a vivid impression in the minds of the listeners, and may furnish a valuable suggestion to salesmen with similar problems. —H. S. Rich, Cromwell, Conn.



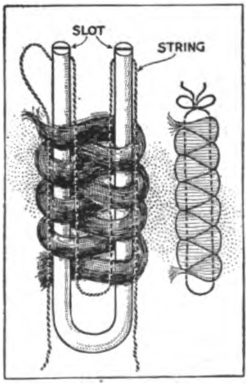
Demonstrating a Farm-Lighting Outfit: The Painted Windows Are All Transparent, with Lights behind the Canvas, So That the Salesman, by Touching a Button, can Illuminate Any of the Windows Visible in the Picture

Changing Blueprints to Imitation of Sepia

By washing blueprints in a solution of one part tannic acid to 10 parts of distilled water, they are changed to a beautiful imitation-sepia tone which is permanent.

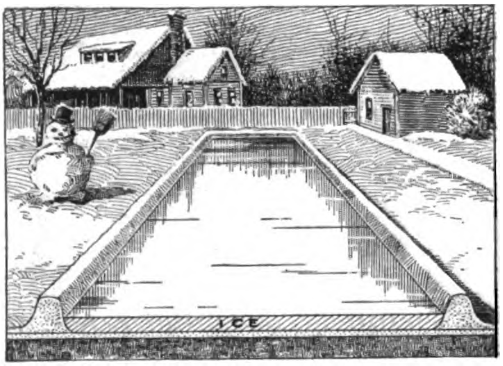
Wireless Hair Crimper or Waver

This instrument may be made of wood or metal in the shape of an elongated "U," with the two ends slit as shown. Ordinary twine is passed through the slits, a loop being made long enough to be held in the hand with the crimper, as well as the two ends of the string. The strand of hair is carried first around one end and then another in figure-eight fashion. Then the two free ends of string are drawn through the hair and removed from the slits, and the free ends tied in a bow knot. The crimper is then removed. The feature of this method is that there is no metal remaining in the hair, and only the soft tufts of hair to lie upon instead of metal. Moistening the hair slightly before curling will make the curl or wave remain in for a longer time after the string is removed and the hair combed out. There are no future fittings to buy, as the strings necessary are always to be had in the home. Ribbon may be substituted for string, if preferred.—Harry E. Gifford, Medford, Mass.



Making a Skating Rink in the Back Yard

In making a rink of this kind, the first thing necessary is to have the ground well frozen, and plenty of snow covering it. With scrapers or shovels, scrape all the snow off the area to be iced, piling it up in good-sized banks all around the space, to a height of 15 in. or 2 ft., finishing off with an old broom. The bases of the snow banks should be about 18 in. through, gradually tapering toward the top. Before packing, throw enough water on them to make the snow very moist. Then pat it well down with shovels or boards, and let it freeze. The first cold night will so firmly set the banks that they will be more like ice than snow. In the same manner, wet down the scraped "floor" of the rink, and let this also freeze well. If most of the water seems to be absorbed the following morning, and little ice shows, wet the ground thoroughly again and again.



It Is Not Difficult to Make a Good Skating Rink in the Back Yard, if the Directions are Followed Carefully, and the Weather Is Not Too Warm

Some cold day which promises a hard-freezing night, flood the basin with water; this can be done most handily with a hose, but if none is at hand, a number of boys with pails can soon accomplish the object. Cover the ground with water to a depth of about 6 in. After a few nights and days of cold weather, the rink will be covered with ice of sufficient thickness for good skating, and then all that is necessary is to keep it in as good condition as possible. Scrape off and sweep off all light snows that may fall, and if a thaw comes, or the surface becomes too badly cut, flood the rink again, bringing the water line above the slush or rough spots, so that the first freezing weather will give you a new and smooth surface of ice.—J. G. Allshouse, Vandergrift, Pa.

Mount the Clothes Basket on Wheels

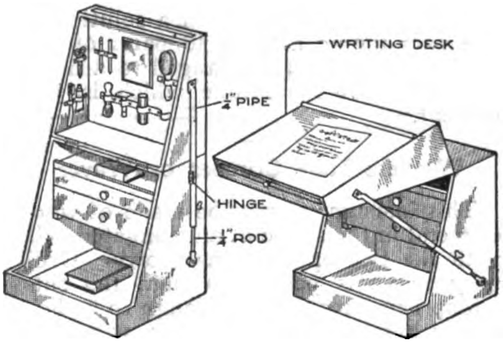
Mounting the clothes basket on a wooden frame provided with small wheels, lightens considerably the labor of wash day. The basket and table may be painted with white enamel to make them easy to keep clean, and the basket can be filled with a much heavier load than would be practicable if it were to be carried. It can then be rolled out to the clothesline, so that the clothes can be lifted directly from it and hung on the line.—Edna Goodman, Glencoe, Okla.

Metal Mirrors for Cyclists

Riders of bicycles and motorcycles have found that metal mirrors, originally intended for soldiers' use, give excellent service as mirrors for observing the street to the rear. They are easily attached to the handlebars of the machine, in the same manner as the now common glass mirror used for the same purpose. While the mirror may also be used on automobiles, bicyclists have found it of especial value, in that it is not subject to breakage, despite the frequent spills that often prove disastrous to the glass mirrors.—J. R. Elliott, Rochester, N. Y.

Kit Box and Writing Desk for Soldiers and Campers

After losing a lot of time hunting around in a kit bag every time an article was wanted, a handy kit box, as shown in the sketches, was designed and made by a soldier for use in his permanent barracks. When closed, the box measures 12 in. deep by 14 in. wide by 28 in. high, which corresponds with local camp regu-

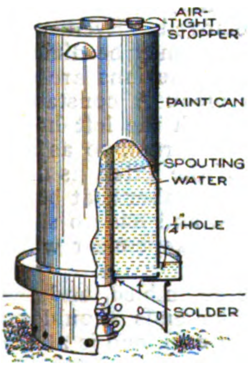


A Handy Kit Box for Soldiers in Barracks or for Campers: It is Easily Converted into a Novel Writing Desk, by Adjusting the Length of the Braces lations. Opened up to its full height, it becomes a very handy dresser, with toilet articles conveniently arranged in elastic loops about a mirror. Below are a shelf, two drawers, and a handy catch-all space. When the top is lowered to the halfway position, the box becomes a writing desk, with writing material conveniently held in the double top.

The two folding braces are made of a peculiar form to permit this. Each consists of two pieces of ¼-in. pipe, hinged together, with a piece of ¼-in. rod projecting into the lower one. The hinge comes into use only when it is desired to close the box entirely.—Pvt. C. M. Vaiden, Edgewood, Md.

Nonfreezing Poultry Fountain

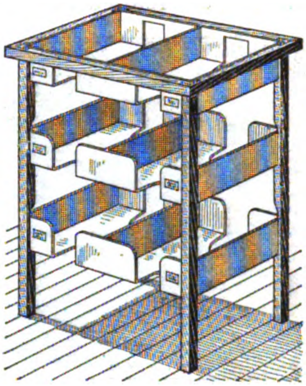
In my poultry yard I am using a homemade nonfreezing drinking fountain, which supplies water for the chickens on the coldest days. The method of its construction is as follows: In the top and bottom of a 5-gal. paint can, cut holes, 3 in. in diameter, and solder in a piece of galvanized-iron rain-water spouting. About 1 in. from the bottom of the paint can, drill a ¼-in. hole. The drinking pan, 15½ in. in diameter and 1½ in. deep, may be made or purchased. Cut a circular hole in the bottom of it, a little smaller than the diameter of the can, and solder the pan to the bottom of the can. The lower pan is 13 in. in diameter, 6 in. high, and has no top. Bore several holes, ½ in. in diameter, around this, near the bottom, to admit air. Place a cheap kerosene lamp in the center of the lower pan, and set the can and drinking pan on top of this, getting the flue in the center.



Remove the stopper at the top of the can, and cork the ½-in. hole. Fill the can full of water, and replace the stopper tightly; then remove the cork from the ¼-in. hole. This allows about 1 in. of water to flow into the drinking pan. On cold days the lamp is kept lighted, and the water will not freeze as with an ordinary fountain.—R. S. Matzen, Fort Collins, Colorado.

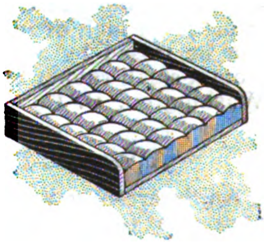
Rack for Office Papers Makes for Neatness

The manager of an office became tired of having his table and desk covered with various baskets for papers, which were to be delivered by a messenger to various persons designated on the baskets. He then designed and ordered made the rack shown in the illustration. It has six compartments, in which the manager places papers destined for six different assistants, or departments. The end holes make it easy to put in and take out papers from these compartments, which are labeled at both ends. One end is within arm's reach of the manager's chair; from the other end, the messenger lifts the papers and distributes them, as directed by means of the labels on the compartments.—Fred C. Gallagher, Augusta, Ga.



Cushion for Knees Gives Comfort While Scrubbing

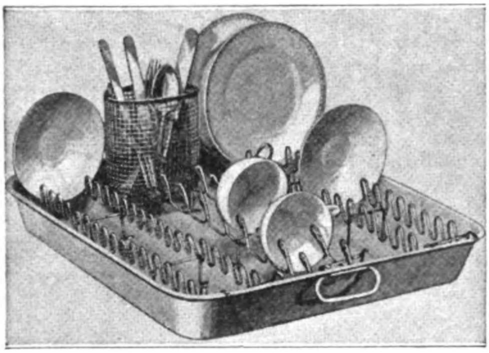
Housewives have always found scrubbing their most dreaded task. It is hard and tiresome, inasmuch as it is often painful to kneel for any length of time. It's a messy job as well, as water will splash on the clothing. The scrubbing box shown in the sketch affords a cushion to kneel on, and keeps the waste water from splashing on the clothing. The box can be made from an ordinary soap box cut in two longitudinally. The cushion can be padded with an old sofa pillow, or excelsior or straw, covered with burlap.—R. O. Helwig, Chicago, Illinois.



Ⅽ Aluminum is a more rapid conductor of heat than cast iron, and great care in preheating it for welding is necessary.

Dish Drier Made of Racks in a Biscuit Pan

Drying the dishes after washing, with a towel, is one of the ancient customs largely discredited by modern sanitation. Even if the towel is clean, it is a waste of time, as the dishes will be cleaner if thoroughly rinsed off with boiling water and left to dry. The dish drainer for this purpose, shown in the photograph, was made by bending stiff wire over nails in a vise, and soldering them together to form a shape which fits into an ordinary bread or biscuit pan. A compartment for silverware is also shown, which was made of wire net. It will be noted that wire supports are provided, which hold the rack for the dishes some distance above the bottom of the pan, so as to leave space for any water which may fall from the dishes. If this space is made an inch or more deep, the dishes can be rinsed by a stream of hot water from a small rubber hose.—S. R. Winters, Washington, D. C.



The Dishes are Drained by Setting Them on a Rack Made of No. 12 or 14 Gauge Steel Wire, Bent to Fit the Edges of the Dishes and Mounted in a Biscuit Pan

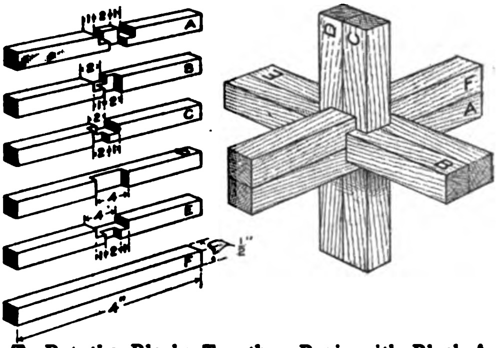
A Wooden-Block Puzzle

An interesting and somewhat baffling puzzle is to put together six wooden blocks, cut to the shapes detailed at the left of the illustration, so as to form the cross shown at the right. It can be done in half a minute after one has learned how, but one might easily spend an hour or more in trying if the method is not known.

The six pieces are blocks of some hard wood, all cut at first to the size of ½ in. square, and about 4 in. long. The ½-in. dimensions, on all the pieces, must be quite accurate, if the puzzle is to work well. Slots are then cut in all but one of the blocks, there being one slot in block D, two intersecting slots in blocks B, C, and E, and three slots in block A. The depth of all slots is ¼ in., or half the thickness of the block. Their width is either 1, 2, 3, or 4 times the depth (¼ to 1 in.), as shown in the dimensions in the details. The slots should of course be smoothed up nicely and made just slightly larger than the dimensions given, so that the blocks will fit into them.

While learning to put the blocks together, it will be helpful to place on each the letter distinguishing it, being careful to place it in exactly the same position on the block as shown. Then assemble the blocks so that the letters come at the positions shown at the right, starting with block A, fitting B into it, then fitting C into its place, and so on until block F is slid into place, locking the cross together until it is removed. Even with these directions, the task may be difficult unless the following precautions are observed: First, hold block A constantly in the same position, with the left hand, until the last block is inserted, so as not to alter the position of the letter, as seen by the eye. Second, remember that block F goes directly over A, and has no slots, so that its path must be kept clear while assembling.

After the device is assembled, and the method is familiar, the ends should be sawed off even, so that each end is at the same distance from the nearest crossing block. Since this is not always the same as the distance to the nearest slot, the ends should be finished off while assembled. The figures are then erased from the blocks, and the puzzle is ready for placing before the novice.



To Put the Blocks Together, Begin with Block A, and Place Each So That the Letter Comes into the Position Shown

The effectiveness of the puzzle depends

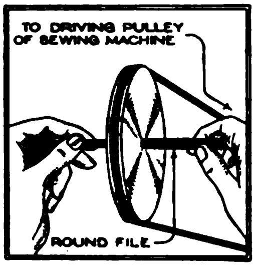
largely on the fact that one may exhibit the structure all assembled, pull it to pieces with two quick motions (removing F and E) and defy anyone to put it back together again.—Tod Masters, Ft. Atkinson, Wis.

Rubber Tube Holds Screw on Screwdriver

To start screws in inaccessible places, slip one end of a piece of rubber tubing, such as is used for gas lighting, over the end of the screwdriver, and the other end over the head of the screw. The tubing will keep the screwdriver in the slot of the screw while starting it. If a rubber tube is not at hand, a piece of paper may be rolled to a conical shape, and will do nearly as well.—James L. Brown, Seattle, Washington.

Reaming a Pulley Hole with a File

A pulley with a ¼-in. hole was to be placed on a shaft which was ⁵⁄₁₆ in. in diameter. No reamer was handy, and filing out the hole in the usual way would have been quite a job. It was done, however, by slipping the pulley on the handle of the file, and connecting the pulley by a sewing - machine belt to a driving wheel of the machine. The ends of the file were then held in the hands, while the pulley was revolved by the belt. If carefully done, the hole will be found fairly true, and can be trued up slightly by hand afterward, if found necessary. Oil should be used on the file, if it begins to feel hot to the fingers.—E. Standiford, Youngstown, Ohio.

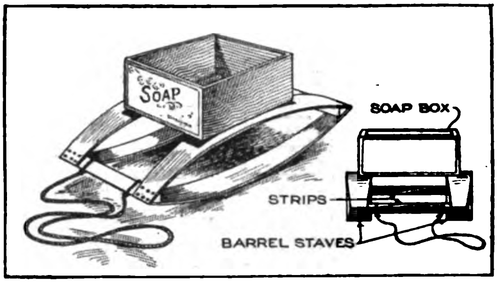


Doors Often Carelessly Misplaced in Small Buildings

Many a farmer and carpenter, when building a shed, coal house, or other outbuilding, fails to consider, in locating the door, whether it is in the right place for rainy weather. If the door is placed under the eaves, rain drips constantly in front of the door, and entering it is far from a dry process. If the door is placed under the gable, this annoyance does not occur. —T. J. Hubbard, Mendota, Ill.

Inexpensive Sled Made from Old Barrel Staves

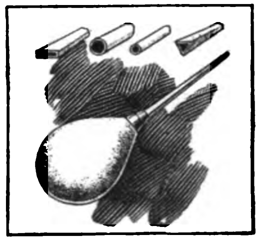
This sled can be made by anyone who can handle a hammer. The materials needed are four barrel staves, two strips of triangular section, and a soap box. The staves, which give the sled a springy motion, are nailed as shown in the sketch, with the strips fitted snugly in the ends. This gives it strength, and provides a place for attaching a rope. The box is then nailed on, forming a sled that will go over bumps like an auto. The sled can be used either for pulling along level ground or for coasting.—Nelson Burns, Buffalo, N. Y.



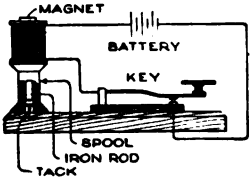
A Soap Box Mounted on Four Barrel Staves Forms a Sled Which Contributes toward Relief from the High Cost of Toys

How to Make Raised-Letter Show Cards

A simple method of making raised letters on signs and show cards, which is perhaps well known to most artists in this line, but might be of interest to a large number of amateurs, involves the use of a rubber bulb, to which are fitted a number of spouts of different shapes. The letters are made by pressing through one of these spouts a ribbon of some suitable substance, following the lines which have been laid out as a pattern for the letters desired. The paint or paste can be made of whiting, dissolved in mucilage, thick glue, or a solution of gum arabic. Pigments can be added to color the paste any shade, and if work is to be done in several colors, a bulb can be filled with material of each color, the spouts being interchangeable on any of them.

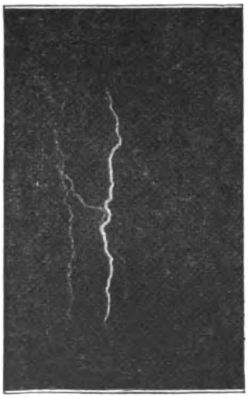


A Very Simple Telegraph Instrument for Fun or Practice

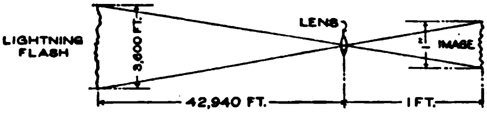


The greatest simplicity is attained by this sounder. A key may be made of any piece of spring brass pressed down to contact on the head of a tack, or a manufactured key can be mounted, if one is available. The sounder itself consists of a wooden spool with an electromagnet coil set on top of it. The coil may be taken from an old electric bell, or made by winding fine insulated wire on a spool like the lower one. Inside of the lower spool is placed a short piece of iron rod, which works loosely up and down over a distance of about 1/4 in., being drawn up when the current flows through the coil, and falling of its own weight when the current stops. As it falls, it strikes the head of a common carpet tack, thus making quite a perceptible click. If an old bell coil is used, it will have an iron core against which the piece of rod strikes when it is drawn upward; if the magnet is made on a wooden spool, a piece of iron rod or screw should be set into it to act as a core. The Morse telegraph code can be learned on such an instrument as well as on any standard instrument.—Wm. Warnecke, Jr., New York, N. Y.

How Long Is a Flash of Lightning?



This photograph of a flash of lightning was taken at night, with a thin double-convex lens of 12-in. focal length. The sound of the thunder accompanying the bolt reached the photographer 38 seconds after the flash was observed. The temperature at the time was 72°, and in still air at this temperature the speed of sound is 1,130 ft. per second. As there was no appreciable wind, the bolt was thus about 38 times 1,130, or 42,940 ft., distant. As will be seen in the diagram, the rays of light coming from the extreme ends of the flash form two similar triangles. The image on the photographic plate was at a distance of 1 ft. from the lens. Careful measurement on the original negative showed that the image of the flash was 1 in. in length, or one-twelfth of a foot. Since the large triangle is of the same shape, its base will also be one-twelfth of its height, and the length of the flash is thus shown to be one-twelfth of 42,940 ft., or about 3,600 ft.—over two-thirds of a mile. If the flash is not parallel with the camera plate, it is even longer than this. Further, the actual ends of the discharge may not be visible, so that the computed value is quite conservative. One may give his imagination full play in contemplating the voltage necessary to produce a spark discharge across a 3,600-ft. gap.—L. Pyle, St. Louis, Mo.



With Proportions Much Exaggerated, the Diagram Shows the Relations by Which the Length of the Flash is Calculated

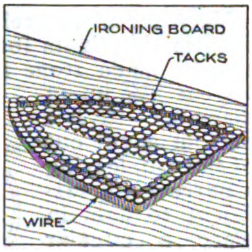
Can Opener Made into a Needle for Coarse Sewing

Many cans used for packing meat, and other food products, are opened by means of a small handle or key, which has an eye for receiving a strip of tin and winding it up. These keys are always furnished with the can, and usually thrown away as the can is opened. Should a large needle for sewing blankets or burlap be required, a splendid one may be made by straightening out one of these keys and filing the end down to a point.—W. W. Snyder, Cleveland, Ohio.

Enabling Automobile Driver to Signal Comfortably in Winter

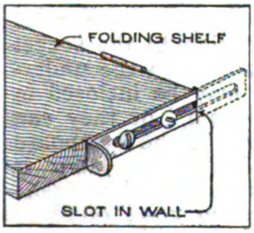
In spite of the hundreds of mechanical signaling devices invented and advertised for automobiles, the old method of thrusting out the driver's hand at the side of the car, whenever a turn or stop is to be made, still remains the favorite. This is, however, very inconvenient when the side curtains are in place, as the curtain must be left open for the purpose, thus letting in cold air or rain. One driver cut a slit in his side curtain, large enough for his hand to go through, and sewed the edges with heavy thread like a buttonhole. It was found that very little wind or rain came in through the slit, and signaling was easy in the ordinary way. This method of signaling, while crude, has the great advantage of not depending on mechanism which may get out of order.

Tacks Driven into Ironing Board Form Iron Rest



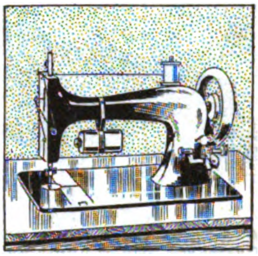
An iron rest which will never get lost or separated from the ironing board consists merely of a large number of tacks, driven into one end of the board. The tacks should not be driven clear in, but should project about ⅛ in., so as to allow an air space below which will prevent a hot iron from burning the board. A row of tacks around the edge can be left projecting a little farther than the others, and will then keep the iron from slipping off. If trouble is experienced by clothes tearing on the tacks, wind some wire around under the heads of the outer row of tacks, as shown in the illustration.

Folding Shelf Supported by Sliding Bar



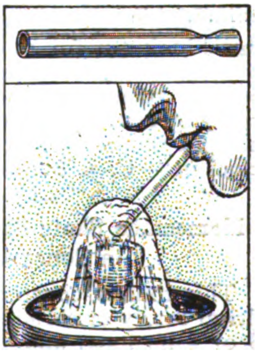
By means of a metal slide, which fits in a slot cut into the wall, a shelf may be firmly supported without brackets below it, and may be quickly folded up on hinges to get it out of the way. The slotted piece on the end slides on two screws; when pulled out from the slot in the wall, the shelf is folded upward and the slide dropped down to prevent the shelf from falling. The slot in the wall is readily made by drilling several holes in line, and cutting out the wood between them with a chisel. The metal slides should be of exactly the same width as the thickness of the shelf, so as to hold it nicely when folded up.—Elmer O. Tetzlaff, Cicero, Ill.

Light for Threading Sewing-Machine Needles



Threading the needles of a sewing machine is a job which requires a good light. A light strong enough to furnish the proper illumination for this purpose might be too expensive, and too brilliant for constant use. A good way for anyone who does a great deal of work on a sewing machine is to attach a flash light by a good-sized rubber band, slipping the band over the end of the machine, and tying it so as to hold the flash light in a small loop at its lower end. When a needle has to be threaded, the flash light can be pulled down so as to illuminate the exact position desired, and as soon as the needle is threaded, it will be pulled back and be out of the way.—L. A. Collins, Louisville, Ky.

Drinking Tube for Use at Bubbler Fountains or Springs

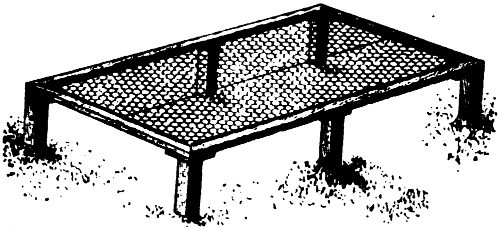


Many persons object to drinking from the bubbler fountains which are now installed in many public places. Some of these may find that a tube, such as the one illustrated, makes the use of the fountains less objectionable. The tube is bent in slightly near one end, to fit the teeth, so that it will not slip from the mouth. Unless made of aluminum tubing, it should be plated with nickel or silver. It should, of course, be kept clean by being wrapped in a paper or placed in a clean case.—H. F. Griswold, Indianapolis, Ind.

¶Hard putty can be made as good as new by simply putting it through a common household-size food or meat grinder, using a fine cutter, and then mixing it with the proper proportion of oil to make it pliable.

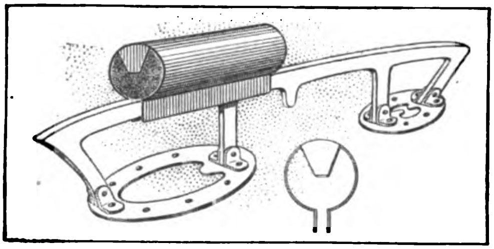
Wire-Netting Platform Useful in the Back Yard

A platform built in a back yard, consisting of wire netting, mounted on a frame of 2 by 6-in. planks, and resting on six 4 by 4-in. legs, was found useful for a variety of purposes. For beating large rugs, the advantage over hanging them vertically will be appreciated by any boy who has ever been given the task of carpet beating. Lace curtains can be stretched and dried on the platform, with no extra apparatus except a few pins, as the platform is set in a sunny part of the yard. Blankets, sweaters, and other articles which are very heavy after washing, may be dried by simply laying them on the netting, and this avoids the tendency which such articles have to stretch and become distorted, when hung on a line. For drying fruit and vegetables, the platform also comes in handy, although one must look out for rain, unless a cover is provided. To complete the list of uses, such a structure has been used temporarily by fastening another strip of netting around the sides to confine some young chickens.—C. J. Brickett, Scranton, Pa.

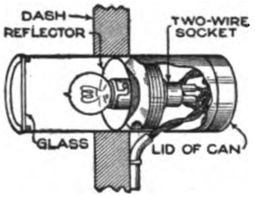

A Stoutly Constructed Wire-Netting Platform Is Useful for Drying Anything from a Blanket to a Lot of Vegetables, Besides Simplifying the Job of Carpet Beating

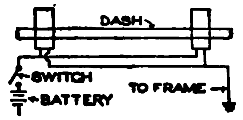
Homemade Skate Sharpener Produces a Concave Edge

This tool is constructed from a cylindrical emery or carborundum stone, about 3 or 4 in. long, and ¾ to 1 in. in diameter. Around the stone is placed a piece of sheet brass or iron, held from slipping off endways by lugs bent over the ends of the stone. The edges of this metal cover are bent up so that the skate blade just fits between them. By running the tool back and forth, with considerable pressure and plenty of water to keep the stone from getting clogged, the skate will be sharpened with a form of edge which will reduce considerably the possibility of slipping while skating.—W. F. Saunders, Boston, Mass.


An Abrasive Stone is Fitted with a Simple Sheet-Metal Guide Which Makes Skate Sharpening Easy, and Gives a Concave Bottom Surface

Side Lights for Automobiles



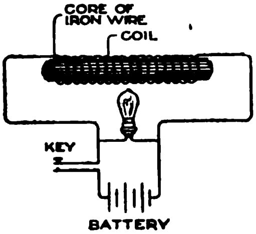


Very useful as well as neat-appearing electric side lights for an old automobile can be made from two small tin cans, 1½ to 2½ in. in diameter. The bottom is cut out of the can, leaving a narrow rim sufficient to hold in place a circular piece of window glass, which can be cut out with a glass cutter, or can be obtained from any hardware or automobile-supply store. The glass is held from slipping backward by a washer of rubber, fiber, or stiff pasteboard. A standard two-wire socket is mounted in a washer consisting of several thicknesses of pasteboard or thin fiber, cut to fit the can. The reflector is formed from tin, cut from another tin can; its edges should be soldered together, and may be soldered to the metal socket. The wires leading to the socket are carried through a hole in the underside of the can, and may be inclosed in conduit or "circular loom," or they can be fastened quite neatly to the dashboard with insulated staples. The lamp is mounted in a large hole cut in the dash; if the car has a sloping cowl of sheet metal, the hole will, of course, be extended also through this. To renew the bulb, or clean the reflector or glass, it is only necessary to remove the lid of the can at the rear and pull out the socket. To make this possible, some extra length of cord must be left in the back of the lamp, and a notch must be cut in the washer which holds the socket.

The lamp may, of course, be wired up

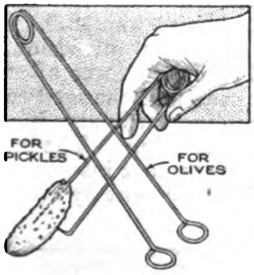
in any way preferred, depending on the kind and voltage of the battery used. Bulbs of suitable size are readily obtainable, for three or six volts. The diagram shows the ordinary wiring placing the two lamps in parallel. A tail lamp similarly constructed can also be made.

Simple Apparatus Demonstrates Electrical Induction



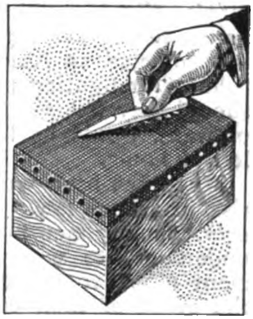
The presence of the momentary induced current, when a steady current is interrupted, is shown very clearly by means of the arrangement shown in the accompanying figure. A coil, which consists of a large number of turns of insulated wire, is wound around an iron core, and is connected in circuit with a make-and-break key and a battery of cells. An incandescent lamp is also connected in parallel with the coil; it should be a lamp designed for a voltage considerably higher than that of the battery. Although the battery may not be of sufficiently high voltage to cause the lamp to glow when the current is passing through the circuit, yet, when the key is opened, the induced electromotive force, due to the self-induction of the coil, will be so great that sufficient current will flow through the coil and the lamp circuit to cause the lamp to glow brightly for an instant.—Peter J. M. Clute, Schenectady, N. Y.

Forks for Removing Pickles or Olives from Bottle



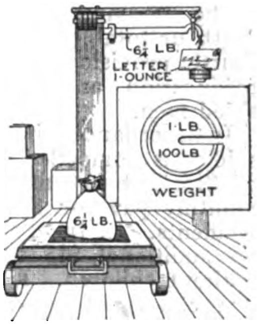
The simple wire tools shown will be found very useful in removing pickles and olives from tall bottles. The method of using them is evident from the drawing. They may be made slightly more convenient to use, if found desirable, by soldering small pieces of sheet brass at the places where the fingers grasp the wire. The forks should be heavily plated with nickel, or preferably silver.

How to Sharpen Chalk Quickly to a Chisel Edge



Artists, sign writers, and shop men, who use chalk sharpened to a chisel edge in order to make fine lines, know how difficult it is to sharpen the chalk in this way with a knife. It is also difficult on sandpaper, because this immediately becomes filled with chalk and ceases to cut. The best thing for grinding off chalk is screen wire. If a piece of this material is tacked tightly over a small box, it is very handy for sharpening the chalk, and the box catches the chalk dust, preventing it from escaping into the air.

Weighing a Letter on a Heavy Platform Scale



"I wish I knew whether that letter weighed more than one ounce," said a grocer's clerk. "You have a scale, why don't you weigh it?" replied a traveling man in the store. "Can't do it on that scale because the finest graduations on the beam are ¼ lb. each." The stranger picked up one of the weights which hang from the top of the beam. "See the figures on that weight, 1 lb. = 100? That means that 1 lb. placed on the counterpoise equals 100 lb. on the platform of the scale, or, in other words, 1 oz. will exactly balance 100 oz. on the scale platform. Now 100 oz. are equal to 6¼ lb. Weigh out 6¼ lb. of anything you please and leave it on the scale platform. Run the poise back to zero and place your letter at the end of the scale beam; if the beam rises the letter is less than 1 oz.; if it goes down it is overweight."—W. H. Sargent, Rutland, Vt.

¶ A Bunsen burner, lighted under the grate, will start a fire quickly.

GOVERNMENT INSURANCE HELPS YANKEE TROOPS DEFEAT HUN

SOME time ago it was said that more than 90 per cent of our soldiers had availed themselves of government insurance. At that time the average fighting man's policy was written for $8,000. Never before in the world's history have armies, so protected as America's, taken to the field. Our fighting men now realize that should they fall, grief, but not the misery of want, would be the heritage of those left at home.

Much has been written about the war-risk insurance law. It is doubtful, however, if many men in the 18-45 draft fully understand to what extent the government offers to protect their interests in the event of their call to arms. Therefore a brief summary of some of the provisions that have been made may not be amiss at this time.

There are in reality four separate, but correlated, acts in force. The first deals with a system of "allotments and allowances," by which the government and the fighting man share responsibility for the care of dependents. The second bill involves the payment by the government of compensation in the event a soldier is killed or disabled in line of duty. The third measure is government insurance, to the maximum extent of $10,000, against death or total, permanent disability. The fourth provision involves a program of reëducation and rehabilitation of disabled men.

In accordance with the first measure, a soldier is compelled to allot a minimum of $15, but not more than half, of his monthly pay for the support of his dependents. In turn, the government pays an additional $15 to a dependent wife without children. If there is a wife and one child, the government pays $25; a wife and two children, $32.50, with $5 monthly for each additional child. When there is one child, but no wife, the government allows $5; for two children, $12.50, and for three children, $20. Other allowances are made when the dependents are parents, brothers, sisters, etc. The government's maximum liability in the matter of family allowances is $50, added to which, of course, is the soldier's compulsory allotment.

In the event of a soldier's death, monthly compensation is paid dependents. A widow with no child receives $25; if there is one child, the payment is $35; two children, $42.50. An orphan receives $20, two orphans $30, three $40. Other allowances are made for dependent parents.

Under the provisions of this same measure, a disabled soldier without dependents receives a monthly allowance of $30. If there is a wife, $45 is paid. In the event of there also being a child, $55 is awarded; two children $65, and three children $75. In addition he receives government medical, surgical, and hospital services, including artificial limbs and other appliances if needed.

The insurance act was passed in order that protection in addition to that already explained, might be afforded every person, man or woman, engaged in recognized war service. By its provisions a soldier is able to take out from $1,000 to $10,000 insurance at less than ordinary rates. Each $1,000 of insurance is payable in monthly installments of $5.75 for 240 months. Thus, in the event of the death or disability of the average soldier, who has $8,000 of insurance, the monthly payment from this source would amount to $46. Were the man disabled, married, and the father of two children, for instance, his total monthly allowance from the government would thus be $111. From this it must be evident that no disabled soldier nor his family ever need be in want. A further safeguard has also been made. Should, for example, a disabled soldier live longer than 240 months, the payments would be continued as long as he lived and was so disabled; or as long as his dependents survived.

The cost of government insurance is remarkably reasonable. A soldier 26 years old pays $80.40 per annum for a $10,000 policy, which, obtained from a private insurance company, would cost him $580.

There is another important provision. The insurance may be kept in force after the expiration of the war and changed to ordinary forms, including ordinary life, 20-payment life, and endowment. The insurance will remain government insurance and be nonsubject to attachment by creditors.

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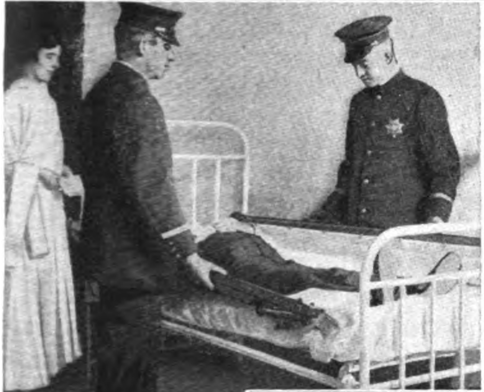
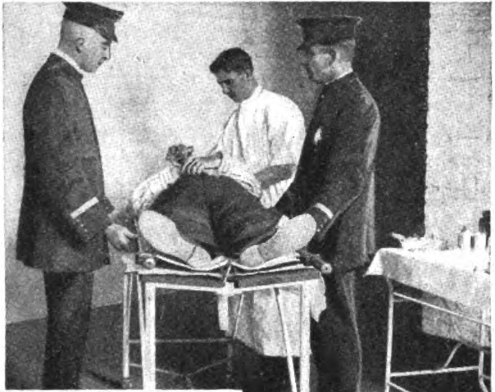
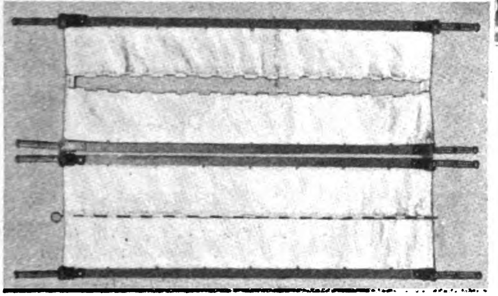
NEW STRETCHER DIVIDES IN HALF LENGTHWISE



Withdrawing the Halves of the Stretcher from Under the Patient, after having Removed the Locking Rods



Patient About to be Lifted from an Operating Table on the New Patented Stretcher, Made with Detachable Halves



The Upper Stretcher has been Divided in Half by Removing the Rods, While the Rods Are in Place in the Lower Stretcher, Interlocking the Loops Forming the Edges of the Canvas Halves

The special feature of a recently patented stretcher, designed to permit the delivery of a patient to a bed with the minimum of discomfort, is its division lengthwise into detachable halves. The center coupling consists of two small steel rods, each 3 ft. long, which are inserted, one at either end, through canvas loops in such a manner that the two parts of the stretcher are interlocked.

The iron braces, which are provided to keep the canvas taut, can be folded into recesses in the wooden sidepieces, and the handles are hinged so that they can be folded under, reducing the length of the stretcher to 6 ft., which is less than the length of a bed. When a stretcher and patient have been placed on a bed, the rods mentioned above are removed and the halves withdrawn.

FRONT-LINE FIRST-AID WORK BECAME AUTOMATIC ROUTINE

It is somewhat astonishing to find that some of the work of the Royal Army Medical Corps in the front-line areas was so systematized, before the close of the war, that automatic action supplanted thought. In all cases of fractures of the lower limbs and extensive wounds of the thighs, for instance, it was made a practice to secure immediate immobilization of the patient. This was done before evacuation from an advanced dressing station or even a regimental aid post. The entire procedure, involving the warming of the patient with blankets and a special stove, the attachment of the splint to a suspension bar on the stretcher, and the arrangement of hot-water bottles and blankets for the journey, was reduced in training schools to a drill in which the various movements were represented by numbers. The result was that after an operator had become thoroughly familiar with the drill, he not only could execute the work in darkness, but, with two assistants, could put up a limb in 2 minutes 45 seconds. The principle was actually taught that in applying a splint under such circumstances, thought should be unnecessary and every action absolutely automatic.

¶Reports among ordnance circles have it that, had the war continued, the United States would have possessed a gun which could shoot 100 miles, thereby considerably surpassing the big guns with which the Germans shelled Paris.

Killed in Action in France, October 5, 1918

LIEUTENANT BOYD was born in Toronto, Canada, in 1883: his father was one of the editors of the Toronto Globe. Upon the death of his father the family came to Chicago, where Lieutenant Boyd was educated. He also spent considerable time in study and travel abroad. Returning to Chicago, he took the law course at the Northwestern Law School, but preferring newspaper work, connected with the Record-Herald. In 1909 he joined the staff of this magazine and for eight years was one of its eastern managers, being located in New York. In 1917 he took the Plattsburg course and was commissioned first lieutenant. Although not in the draft age at the time, he volunteered, and was sent overseas in January, 1918. During his training in France, his letters frequently expressed the great responsibility he felt for the men under him. He was repeatedly in action.

His sense of humor, so much enjoyed by his friends, could not be restrained even in describing one of the early engagements in which he took part, for he wrote, after giving a picture of the awful gun fire, "In fact I think I was shot at with everything known to warfare except bows and arrows."

LIEUTENANT GORDON BOYD

AN HONORED MEMBER OF OUR STAFF

His last letter, written September 10th, reads: "We are back in a rest area again and in a fine part of France. My billet is in the home of the mayor of the village around which the troops are stationed. It's a great treat to be able to take one's clothes off at night. We were in the front area three weeks, and during that time had my clothes off only once, and during ten days did not even have my boots off. It's remarkable how well we all keep in spite of this sort of life, but we are as hard as nails. I was placed in command of a Lewis gun section to act as a contact patrol. On the afternoon of August 31st, with nine other patrols, we went over the top. Soon after, the other patrols went back, but we kept on, and after crossing three belts of Boche wire we ran into the Boche himself—a whole nest of dugouts. We were lucky enough to capture and bring back fourteen prisoners, after fierce resistance by the Heinies, in which some of my men were killed. The affair lasted 2½ hours. I am putting in for leave to Paris today, and if it goes through you will hear from me there. The news is very good these days; it will be a wonderful day when peace does come, won't it?"

The leave was not granted; instead he returned to the front. Beyond the official confirmation of his death no details have been received.

His was one of those genial, refined, sensitive natures, beloved by all who knew him. As he said on leaving, he deemed it a "grand and sacred privilege" to do his part. That he acquitted himself with fearless courage on the battle field before that last, fatal combat, we have abundant evidence. That he was the same undaunted soldier to the last, we know. His passing is a part of the great cost of freedom for the world, and is a personal loss to all who ever knew him.

TWENTY-SHOT HYPODERMIC SYRINGE IS INVENTED

Among the war inventions that probably will prove valuable in peace time is a magazine hypodermic syringe that may be used 20 times without refilling. Obviously its chief merit is that of convenience when physicians and surgeons are working under fire and in dark dugouts where continual recharging of syringes entails difficulty and retards operations. The instrument is supplied with a platinum needle which permits sterilization in a flame. The cap that protects it, when not in use, is kept filled with iodine or alcohol. When large numbers of persons are being inoculated with typhoid serum, for instance, an instrument such as the magazine syringe evidently saves much time.

CHICAGO SEEN AS IRON CENTER BY INDUSTRIAL EXPERT

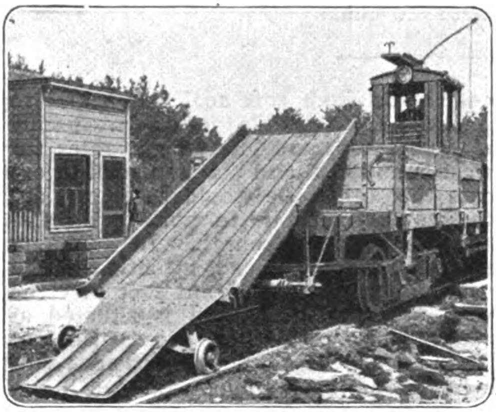
According to an analysis made by a professor of industry at the University of Pennsylvania, the Chicago district is destined to supersede Pittsburgh as the iron and steel center in America. Several important factors, he points out, are contributing to the gradual decline of the latter's supremacy. Among them are the facts that Chicago is now virtually the center of population, one of the greatest railway centers in the world, an important lake port, and the site of many of the nation's largest iron-using industrial plants. The main trade routes no longer pass through Pittsburgh; by-product coal made from soft coal has begun to replace Connellsville coke, wastefully manufactured, and low freight rates for west-bound coal and coke, shipped in ore cars that otherwise would be empty, are factors that conspire to work to the disadvantage of Pittsburgh. In summing up the situation, he calls attention to the well-known and significant fact that the world's largest steel mill is situated at Gary, Ind., within an hour's ride of Chicago's business center, which adds considerable strength to his argument.

RIVETLESS BARGE IS BUILT IN GREAT BRITAIN

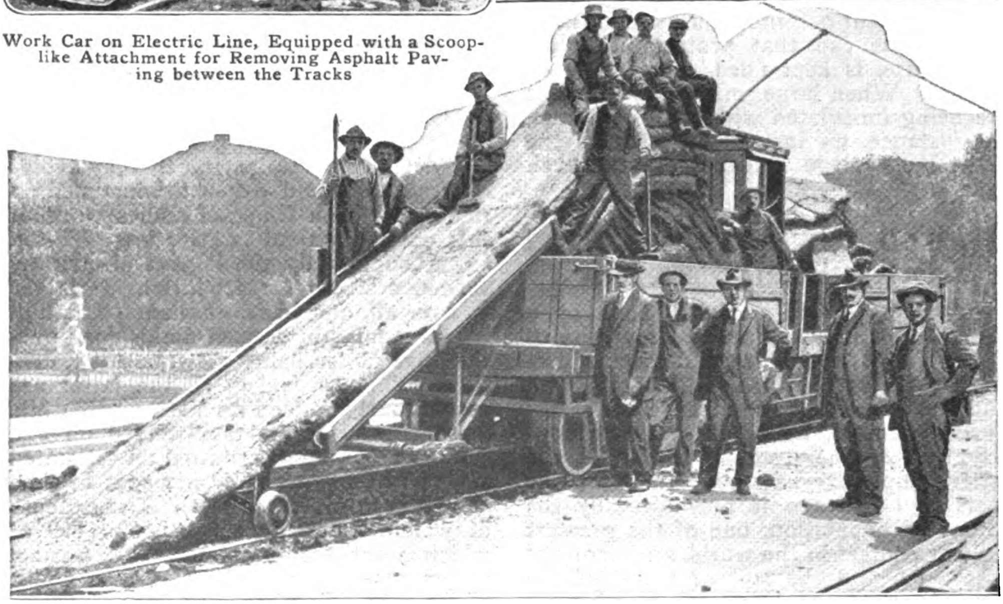
There has been much discussion of late about the feasibility of building electrically welded steamships and thereby avoiding the time and expense consumed in riveting. From England comes word of the completion of a rivetless 275-ton barge, supposedly the largest electrically welded craft so far produced. It is 125 ft. over all, and 16 ft. of beam. The hull is rectangular in section amidships—only the bilge plates being curved. All watertight joints as far up as the latter are continuously welded on both sides, while those thereafter are tack-welded on one side. The process permitted an estimated saving of from 25 to 40 per cent in time and 10 per cent in material. The expense of welding amounted to $1,500, $890 of which went for electrodes. In normal times this item would be less by about 60 per cent. Another experimental barge, with certain parts riveted and others welded, is to be built.

SCOOP TEARS UP AND LOADS CAR-TRACK PAVING

An immense amount of labor has been saved in removing asphalt paving from between the rails of certain car tracks in San Francisco by mounting a sort of scoop in an inclined position in front of a work car and using that means to tear up the paving and load it. The forward end of the scoop is supported on two small wheels and extends almost down to the paving, while the rear end rests on the end of the car. The work is started by prying up a section of the asphalt so that the nose of the scoop can be inserted under it. Then the scoop and car are moved forward at a slow pace and the asphalt is forced up the incline into the car. Under the supervision of a few workmen a car can be loaded with strips of paving in about 45 minutes. The scheme practically does away with the use of shovels and picks.



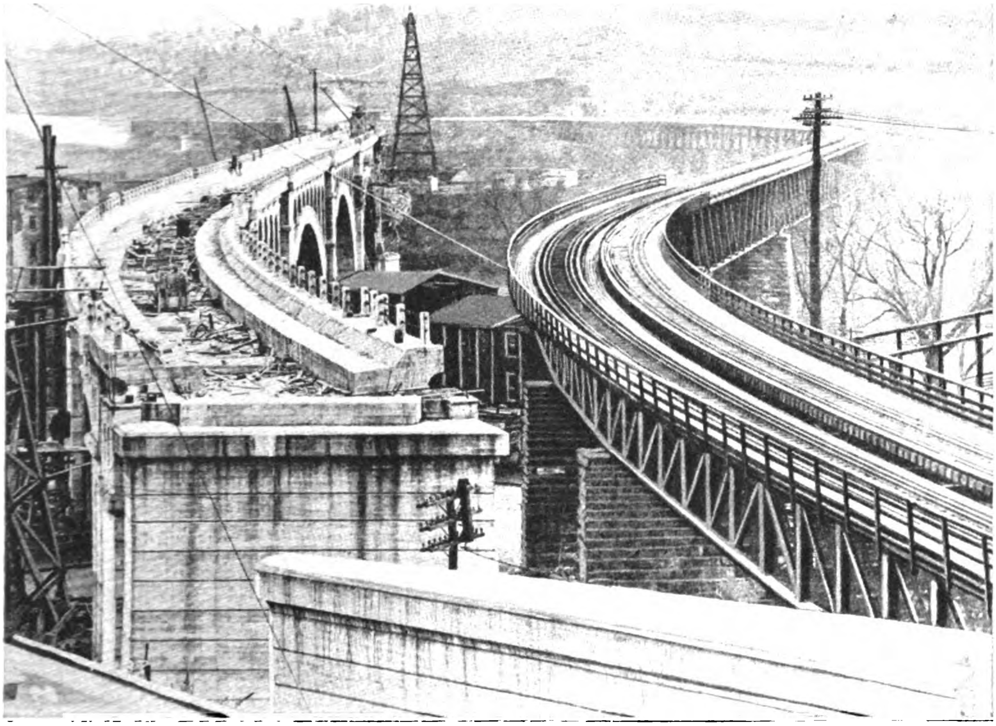
Work Car on Electric Line, Equipped with a Scoop-like Attachment for Removing Asphalt Paving between the Tracks



How the Self-Loading Outfit Operates: As the Car Moves Forward the Paving is Forced to the Top of the Incline, Where It is Broken into Sections and Piled by the Workmen. A Load can be Obtained in About 45 Minutes by This Means

EXHIBIT AT NATIONAL MUSEUM TELLS STORY OF WAR

The most complete collection of relics relating to the great war to be seen in this country is being installed in the National Museum in Washington. Together with priceless material having to do with previous wars in which this country shared, it will form a wonderful record of America's achievement. The new collection vividly illustrates the military and naval activities of all countries in the war—the allies and the enemy, as well as the United States. Specimens of every conceivable sort, including food, equipment, arms, tanks, aeroplanes, mines, and so on, are being put on display. A complete collection of commemorative medals and military and naval decorations is an interesting feature. One of the especially revered objects is an American flag fashioned by five faithful women in Islay, Scotland, for use at the funeral of the American soldiers lost with the transport "Tuscania."



BY COURTESY OF ENGINEERING & CEMENT WORLD

The New Reinforced-Concrete Arch Railway Bridge across the Schuylkill River at Manayunk, Pennsylvania, before Completion, and the Old Structure That It Replaces

CONCRETE RAILROAD BRIDGE BUILT ON REVERSE CURVE

Although reinforced-concrete arch railway bridges have ceased to be uncommon, it is rare that one is built on a curve. More than ordinary interest therefore is to be found in a heavy structure recently completed at Manayunk, Pa., by the Pennsylvania lines. It is a double-track concrete arch bridge that spans the Schuylkill River on a reverse curve. The bridge is 1,800 ft. long. It consists of 15 spans and represents an investment of about $700,000. The opposite ends of the structure are built on six-degree spiraled curves, between which three arch spans carry a 463-ft. tangent. The longest of the spans are three that cross the river proper. Each of these has a reach of 150 ft. and rises to a height of 50 feet.

¶By simplifying the system of tickets given to the passengers on busses in London, a saving of 100 tons of paper pulp was effected in the course of a year.

REMAINS OF BURNED MARKET MADE INTO AUTO STATION

The concrete floor and piers for several stalls, which were all that remained when a market in a western city was destroyed by fire some time since, have been utilized for a particularly efficient service station for automobilists. On the long, narrow concrete foundations which project above

Service Station for Motorists on the Site of a Market Which Burned: The Piers of the Stalls have been Utilized as Foundations for Oil and Gasoline Pumps and for Air Pipes the floor like isles of safety in a street, oil and gasoline pumps and air tubes have been installed. All told, there are six stalls at which as many cars can receive service simultaneously, so that there is practically no delay for customers.

SELF-COOLING WATER HOLDER MADE LIKE MEXICAN JARS

In several San Francisco offices clay jars, patterned after the clay water containers commonly used in Mexico, are being employed in drinking-water stands in place of ice-cooled coils. The water is delivered into the clay holder from an inverted 6-gal. bottle set in the top. The clay is somewhat porous and the evaporation that takes place keeps the water within quite cool.

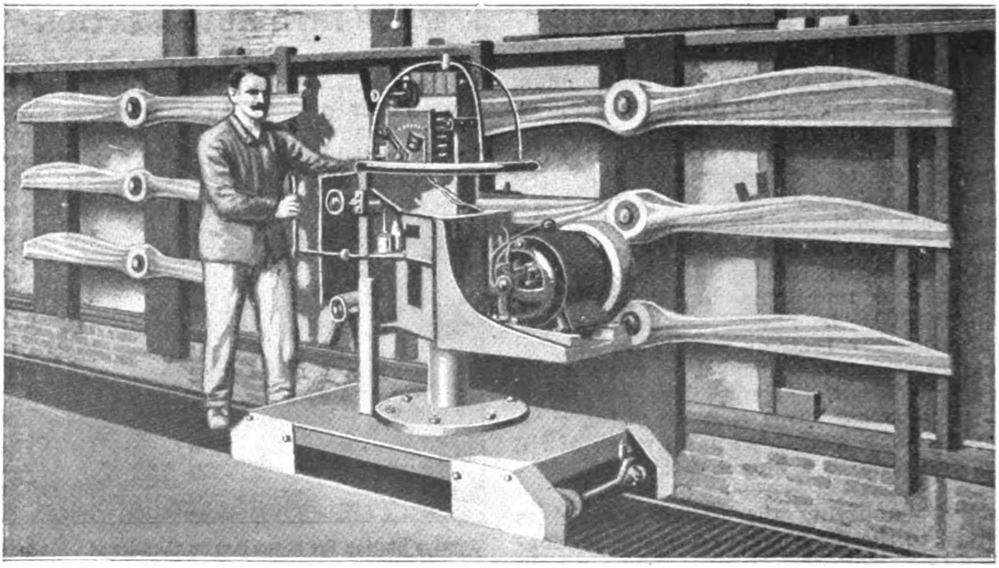
ⅭSpain is now building the largest concrete ships in the world. One vessel of 6,000 tons was launched a short time ago at Barcelona.

AMERICANS USE THREE MILES OF FRENCH WATER FRONT

It is estimated that the material of all sorts handled for our soldiers in France, including military supplies, food, clothing, guns, and all other army requirements, amounts to 50 lb. per day per man. For an army of 2,000,000 men this means handling 50,000 tons of goods daily. It is said that some three miles of French water front and 45 docks in five main ports have been occupied by United States forces for the purpose of handling this vast amount of freight.

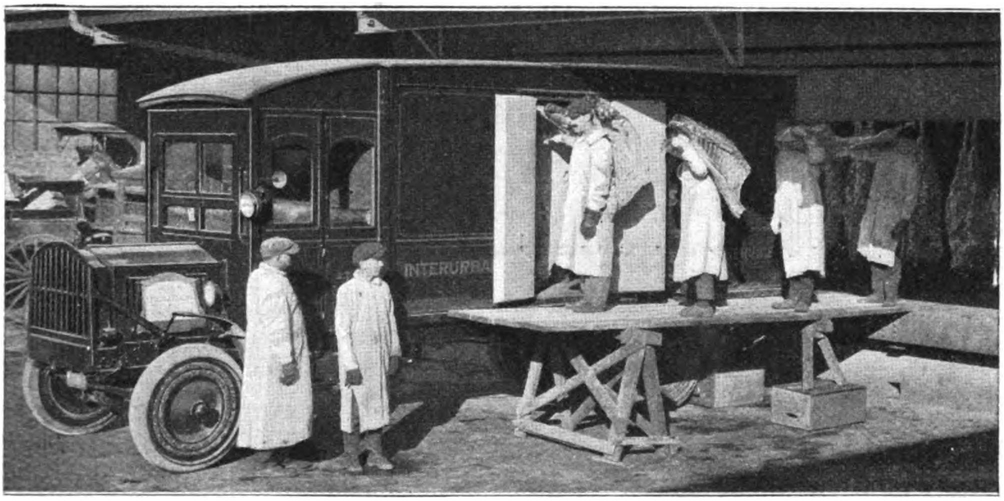
AUTOMATIC CARVING MACHINE SHAPES AERIAL PROPELLERS

Probably no one machine has done more to aid the production of aeroplane propellers than an automatic apparatus, electrically driven and manually controlled, that carves from three to six laminated blocks at one time. The contrivance is somewhat similar to certain manifold sculpture-reproducing machines, and is moved along a track in front of the embryo propellers, which are arranged vertically in tiers. After the blocks, which are built up of carefully balanced one-inch, straight-grained, kiln-dried selected wood, are carved to about one-fourth inch of their finished size and shape, they are placed in a conditioning room for a fortnight before being worked down and finished.



BY COURTESY OF LA NATURE

Showing One of the Electrically Driven Automatic Carving Machines Shaping Three Aerial Propellers at a Single Operation



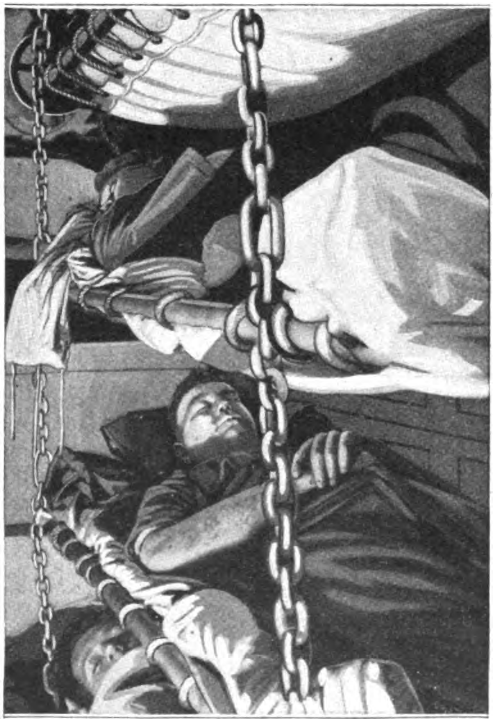
Loading One of the Big Refrigerator Motor Trucks with Meat for Transportation to Toledo from Detroit: On the Road the Heavy Machine Pulls a Trailer

REFRIGERATOR MOTOR TRUCKS IN INTERSTATE SERVICE

Some time ago mention was made that one of the large Chicago packing companies was successfully employing refrigerator motor-car trailers for distributing fresh meats between its local plants and branch houses. It is interesting therefore to note that the idea has been adopted and expanded by a Detroit company. It requires two and a half days to ship a carload of fresh meat from Detroit to Toledo by rail. The trip is now being made in six hours by refrigerator trucks with trailers attached. The cargo carried by one of these combination units is surprisingly large, 18,000 lb. of meat constituting a load. The service has been placed on a paying basis by accepting express on the return trips.

SLEEPING QUARTERS ABOARD SUBMARINE CRAMPED

It may well be reasoned that few American travelers, averse to sleeping in upper berths, enlisted for submarine service during the war. Space aboard an undersea vessel is limited, and not the less so in the sleeping quarters. Therefore an overwhelming majority of the bunks are "upper berths" that are reached only by the exercise of some gymnastic skill. They are placed one above the other in tiers and are held by heavy chains at head and foot. It follows, nevertheless, that men who have been in the service a short time learn to sleep as unbrokenly as playexhausted children, despite the dampness of the atmosphere, the elevation of their bunks, and the depth to which their boat may be submerged.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This Picture of Restful Repose would Not Lead One to Believe the Sleeping Quarters aboard a Submarine to Be Unpopular. The Photograph was Taken When the Vessel was Submerged 100 Feet

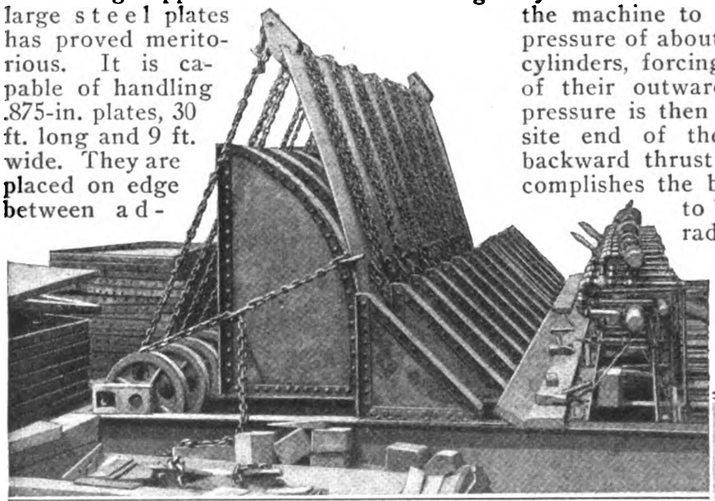
HOW IMPURITIES IN BRINE AFFECT SALTED FISH

An investigator for the Bureau of Fisheries, who has been giving special study to the salting of fish, finds a number of interesting conditions resulting from the use of impure salt. Calcium chloride, magnesium chloride, and sodium sulphate are impurities commonly found in salt, which cause the latter, when made into brine, to penetrate the flesh more slowly than if pure salt is used. Consequently, in hot weather, fish may partly spoil through the use of impure brine. The investigator points out that where pure salt is used the fish is soft, with brownish or grayish meat. Magnesium chloride keeps the skin bright, and a small amount of calcium chloride makes the fish hard. Both the latter and magnesium chloride give the flesh a white appearance.

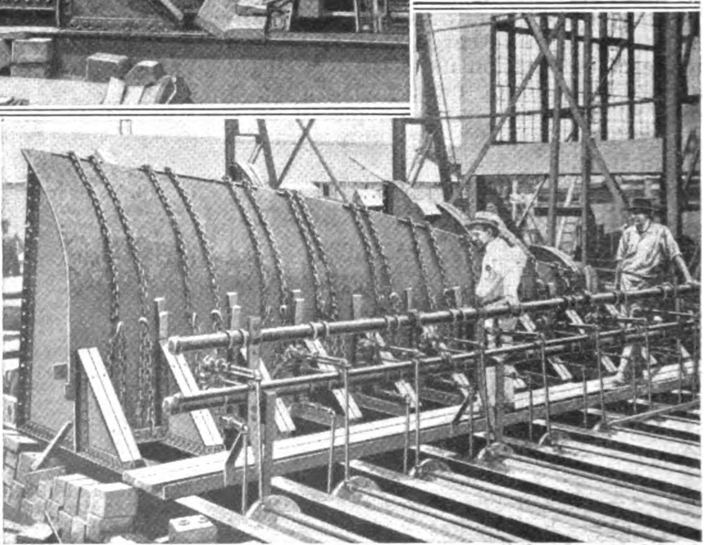
ℭIn the third quarter of 1918 the construction of merchant vessels in allied and neutral countries, exclusive of Great Britain, reached 972,735 tons. Adding the British output of 411,395 tons, the world's output during the period exceeded all losses by nearly 500,000 gross tons.

PNEUMATIC APPARATUS BENDS SHIP PLATES COLD

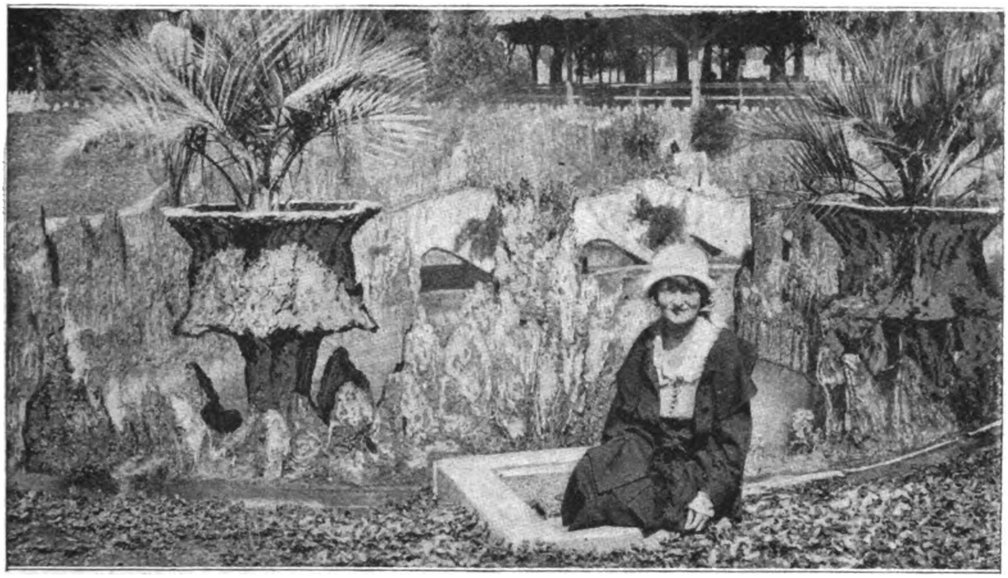
At one of the southern shipyards an interesting apparatus for cold-bending large steel plates has proved meritorious. It is capable of handling .875-in. plates, 30 ft. long and 9 ft. wide. They are placed on edge between adjustable formers and triangular brackets that hold them securely in position. Chains attached to the structural frame are passed over the top of the plate, around sheaves mounted at the base in the rear, and about others attached to the pistons of horizontal pneumatic cylinders. The latter extend beneath the structural framework and are accurately controlled by water valves. When all is ready for the machine to be operated, water at a pressure of about 35 lb. is admitted to the cylinders, forcing the pistons to the end of their outward stroke. Air at 95-lb. pressure is then introduced at the opposite end of the cylinders. It is the backward thrust of the pistons that accomplishes the bending. If it is desired to bend a plate to a uniform radius, a master valve is opened which allows the water to be discharged simultaneously from each cylinder. If one part of the



Side View of the Cold-Bending Apparatus, Showing Chains Attached and All in Readiness for Curving a Large Rectangular Sheet of Steel



The Picture Above Indicates How a Plate is Bent by being Pulled against the Curved Formers. In the Foreground, between the Beams, may be Seen Some of the Horizontal Pneumatic Cylinders That Do the Work



An Unusual Fountain Made Chiefly of Jagged Fragments of Lava, from Which Numberless Streams of Water Pour: At Night, Concealed Electric Lights Illuminate the Scene with Constantly Changing Hues

plate is to be bent more than another, however, individual water valves are opened. This arrangement obviously gives positive control, for water is not elastic and when its discharge from a cylinder is prevented, the piston, regardless of the air pressure behind it, cannot advance.

APPARATUS FOR DETECTING CURRENT LEAKAGE

An ingenious outfit has been designed for detecting current leakage in the ground near electric lines. It consists of two metal plates of special design, which are strapped to the shoes of the person making the investigation, a battery and controlling switch carried at the waist, and a telephone receiver. When the observer walks about where there are earth currents they are detected by sound in the receiver. If the observer's feet stand parallel with the flow of the current the sound is the clearest, while if he stands with his feet at right angles to the direction of the current, the instrument is silent. This is an aid in finding the source of the current.

ℭThe making of bayonets by rolling has recently been proved satisfactory, thereby saving about 70 operations, it is said. The Ordnance Department has placed an order for 300,000 bayonets made in this manner.

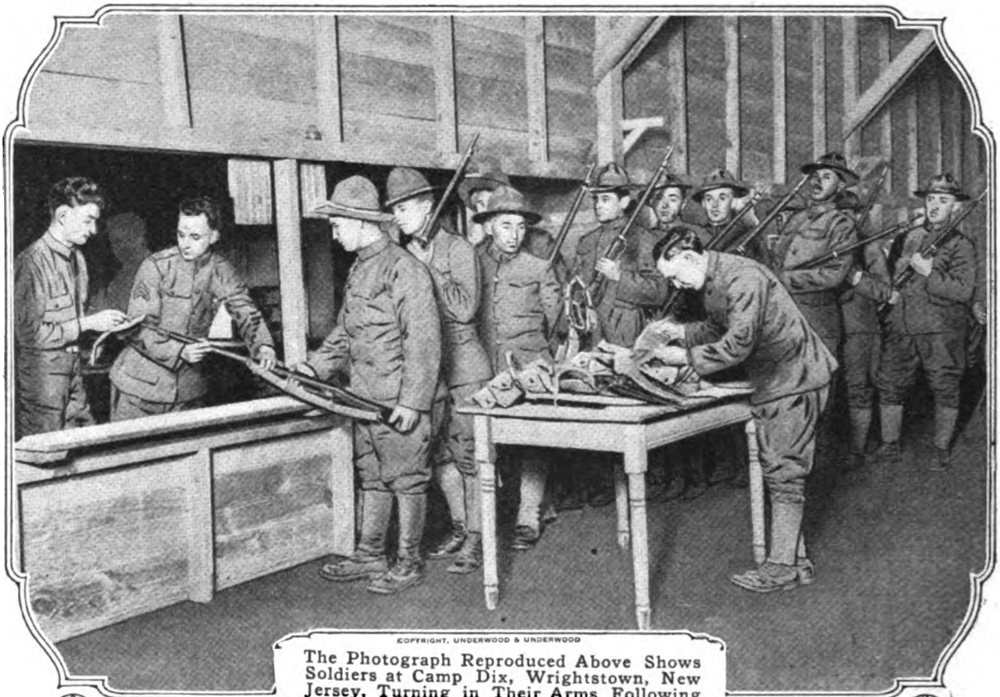
FOUNTAIN OF UNUSUAL BEAUTY MADE OF LAVA FRAGMENTS

A fountain of extraordinary beauty, the sides of which are composed of jagged pieces of lava cemented in place, has recently been completed in a western city. Hundreds of concealed water pipes lead to these rocks, their ends being imbedded in the porous substance so that water flows from the lava in numberless tiny streams that discharge in all directions. With the aid of ferns and palms, the place has been given the appearance of a grotto. At night, hidden electric lights illuminate the fountain with constantly changing hues.

URGE MOUNTAIN LAUREL AS NATIONAL FLOWER

Efforts are being made by officers of the National Federation of Women's Clubs to secure congressional indorsement of the mountain laurel as the national flower. Those favoring this action point out that the laurel has always been a symbol of victory, that it is evergreen and so can be used for decoration in summer and winter, that it blooms on Memorial Day, Independence Day, and Flag Day, and that it is grown in a majority of the states and can be transplanted. Its clusters of starlike blossoms on one stem are pointed to as emblematic of the union of the states.

TRAINING TROOPS AT ARMY CAMPS MUSTERED OUT



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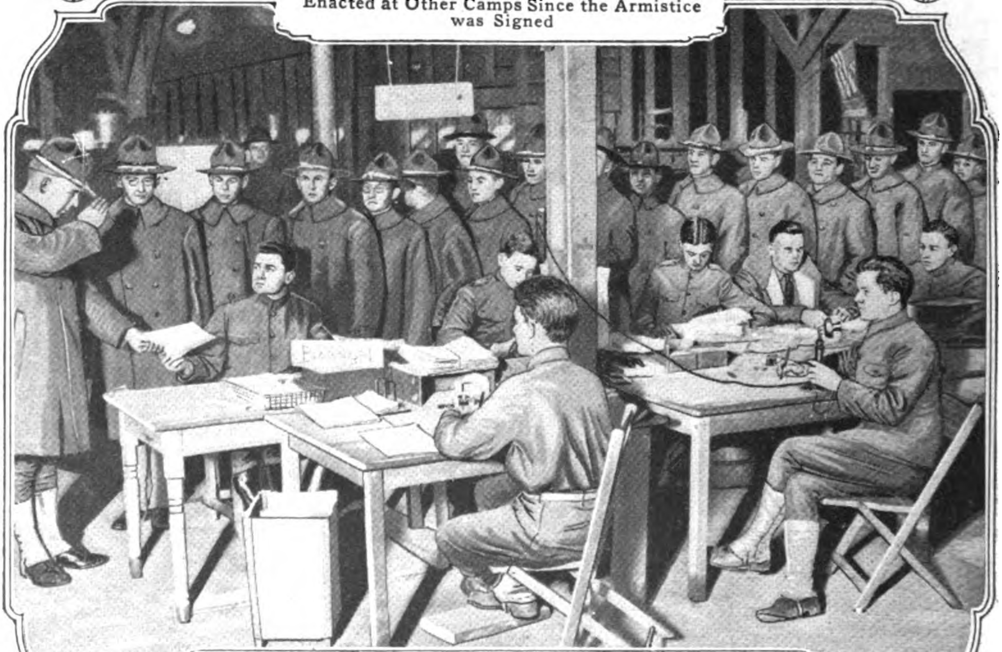
The Photograph Reproduced Above Shows Soldiers at Camp Dix, Wrightstown, New Jersey, Turning in Their Arms Following **the Receipt of Orders from Washington to Muster Out.** Similar Scenes have been Enacted at Other Camps Since the Armistice was Signed



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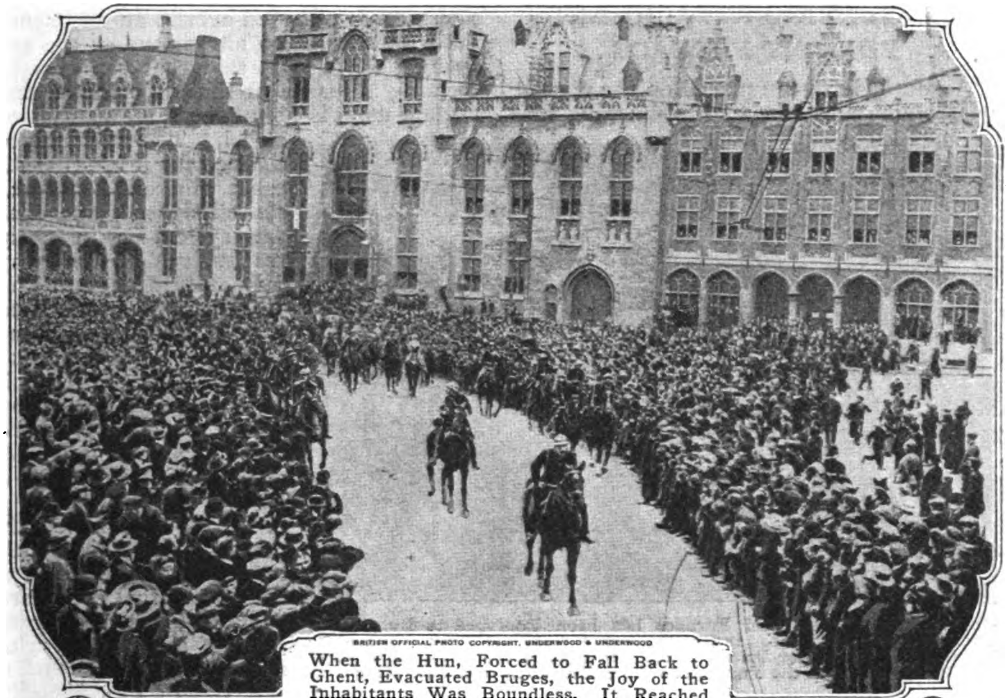
Many Students Complained That It Was Just Like the Hun to Cheat Them Out of a European Trip, While Others, Eager to Return to Their Civil Occupations, Were Glad to be Released from the Service. The Picture Shows a Line of Men Receiving Their Discharge Papers

BELGIAN KING AND QUEEN ENTER BRUGES



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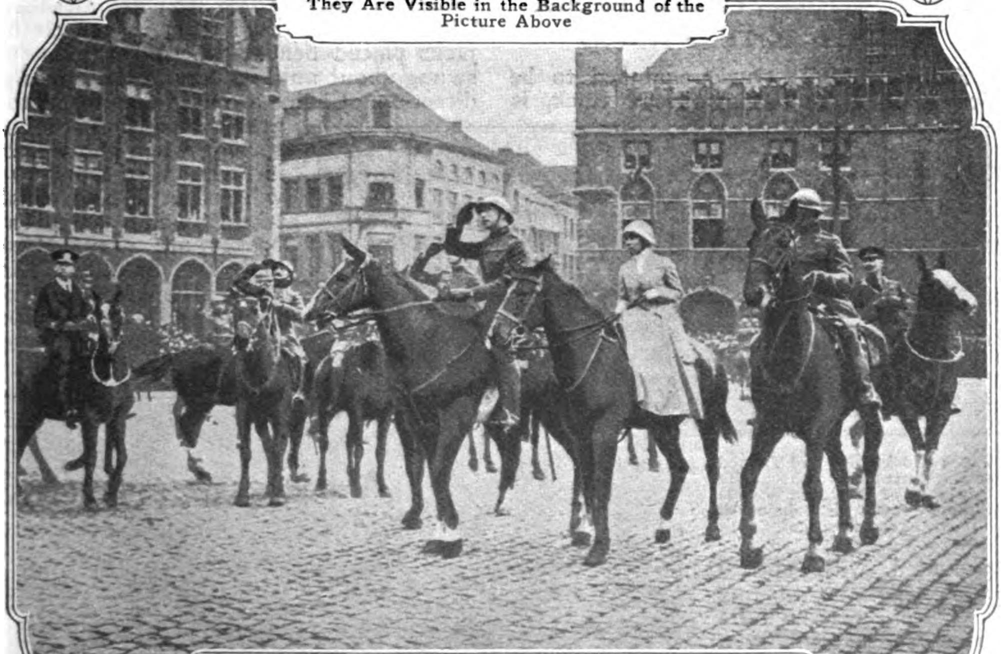
When the Hun, Forced to Fall Back to Ghent, Evacuated Bruges, the Joy of the Inhabitants Was Boundless. It Reached Its Climax When King Albert and Queen Elizabeth Subsequently Entered the City. They Are Visible in the Background of the Picture Above



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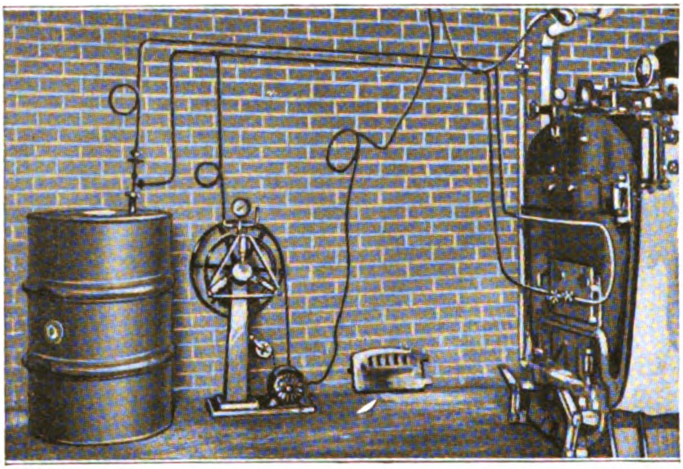
The Royal Party Saluting the Belgian Flag in the Square at Bruges, Which for Four Tragic Years Was in the Crushing Grip of the Teutonic Mailed Fist: The King and Queen Are in the Center of the Picture, and at the Extreme Right Is Admiral Sir Roger Keyes

OIL-BURNING ATTACHMENT FOR ANY FURNACE

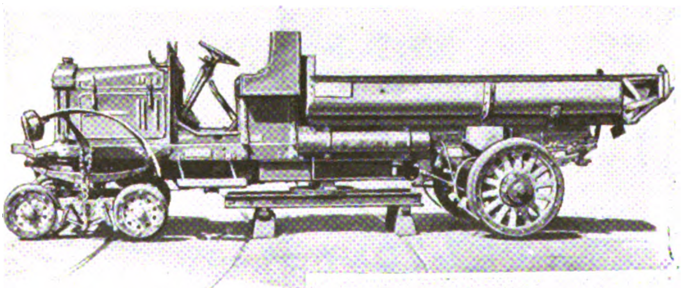
An outfit has been placed on the market with which any type of coal-burning furnace can be changed over to an oil burner with practically no alterations of the existing plant. It is said that the cost of burning kerosene or fuel oil, such as this system uses, is about the same as that of coal. The advantages claimed for it are that all ashes, clinkers, soot, etc., are eliminated, and that the system is instantly responsive to varying temperature needs. The oil burner is attached to a new furnace door which is substituted for the old door, and the oil is discharged from the nozzle under pressure and mingled with air. A motor connected with a light socket drives a triple concentric air pump, which serves not only to draw the oil from the 50-gal. fuel container but also helps to convert it into a spray at the nozzle.



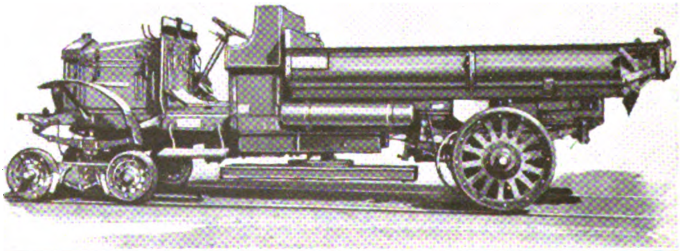
Outfit with Which a Coal Furnace has been Equipped to Burn Oil: The Liquid Fuel is Forced into the Furnace from the Tank at the Left by Means of the Motor-Driven Pump Set against the Wall. The Only Change Made in the Furnace Is the Substitution of a New Door

FIFTH WHEEL UNDER TRUCK SERVES AS TURNTABLE

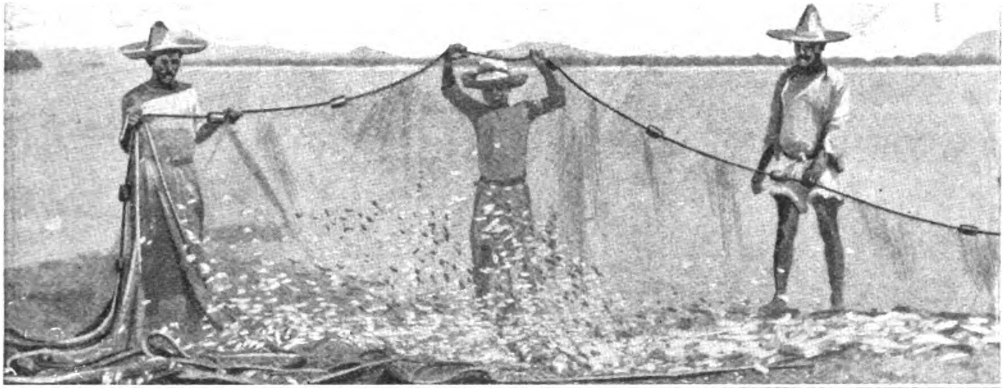
An automobile truck, equipped to be driven on a mountain-railroad track, is provided with special apparatus for turning it around within its own length, making a turntable unnecessary. This device consists of a fifth wheel, mounted under the center of the truck, to which two pieces of heavy angle iron are attached. The car, when lifted from its wheels by jacks placed beneath these bars, can be swung about until it faces in the opposite direction. Chains are used to prevent too great expansion of the springs when the weight is removed from the wheels. Four small wheels with special brakes are provided at the front. Sand to aid in quick stopping is carried in a cylinder at one side, and is forced out by compressed air.



Truck Blocked Up and Turned at Right Angles to the Track by Means of the Fifth Wheel: Chains Prevent Expansion of Front Springs



Automobile Truck Built for Use on a Mountain Railroad: In Order That It may be Turned About without the Use of a Turntable, a Fifth Wheel, beneath Which Jacks can be Set to Raise the Car, has been Installed under the Center

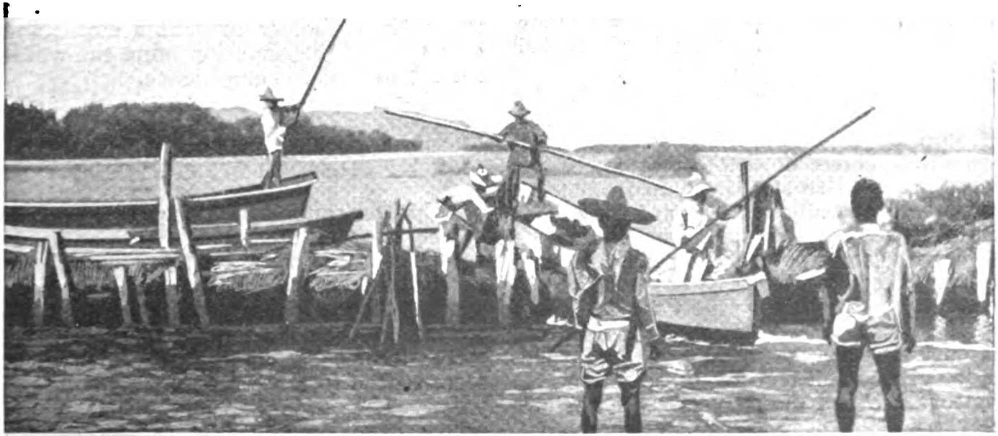


Indians Employed by Chinese on the West Coast of Mexico, Displaying a Yield of Shrimps: In These Waters the Shrimps Breed in Great Abundance and Commonly Measure from Four to Six Inches Long

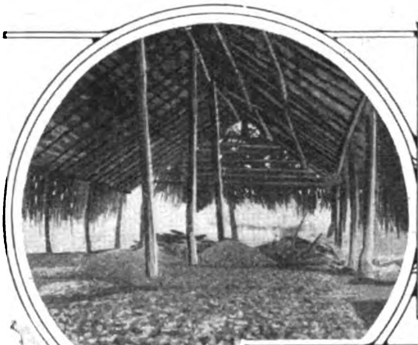
CHINESE CONTROL MEXICO'S BIG DRIED-SHRIMP TRADE

AMONG the little-known but nevertheless exceedingly profitable industries in Mexico is the traffic in dried shrimps, a trade in which successful pioneering was done 15 years ago by a poor Chinaman at a point a few miles south of Mazatlan on the western coast of Mexico. Today this man owns a large fleet of fishing boats, has a working capital of over a third of a million dollars, and does a yearly business of nearly $200,000, about two-thirds of which is from dried shrimps. The market for this product exists chiefly among the Chinese of the Orient and the North American Pacific coast, and among the Mexicans.

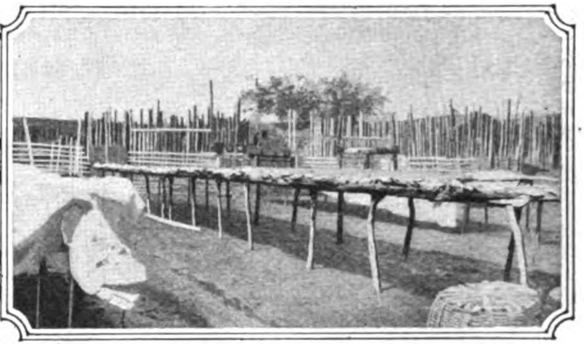
Much of the western Mexican coast is marked by lagoons and the mouths of numerous fresh-water streams. It is near the meeting point of the salt and fresh water that the shrimps are caught in great abundance. In fact, the number of shrimps is so great that the Chinese, who still practically monopolize the industry, utilize only a small fraction of the available supply. The process employed by these orientals in catching and preparing the shrimps, they learned in their native land. The breeding place of these creatures is in shallow fresh-water lakes. After breeding they rush down to the salt water, and it is then that they are caught in nets and traps. About eight miles inland from one of the west-coast ports is one of these breeding lakes, near the outlet of which has been built a dam 1,800 ft. long. Along this barrier traps are stationed every 300 ft. These are emptied



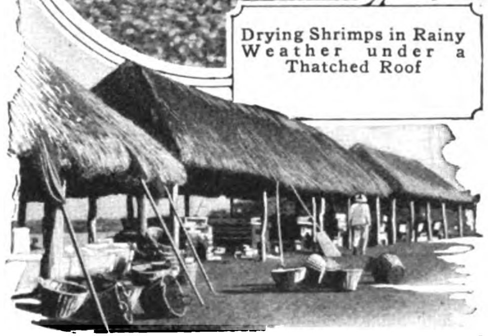
Fishermen on the West Coast of Mexico Starting to Make Their Daily Round of the Shrimp Traps: A Morning's Harvest Often Amounts to Many Tons



Drying Shrimps in Rainy Weather under a Thatched Roof



Drying Yard of Chinese Fishermen near Mazatlan, on the Western Mexican Coast, Opposite the Southern End of Lower California



Beneath the Thatched Roofs Are Crude Oven-Heated Boilers in Which the Shrimps are Cooked before being Dried

by boatmen, many of them hired Indians, and the daily harvest amounts to many tons, sometimes three or four tons per trap.

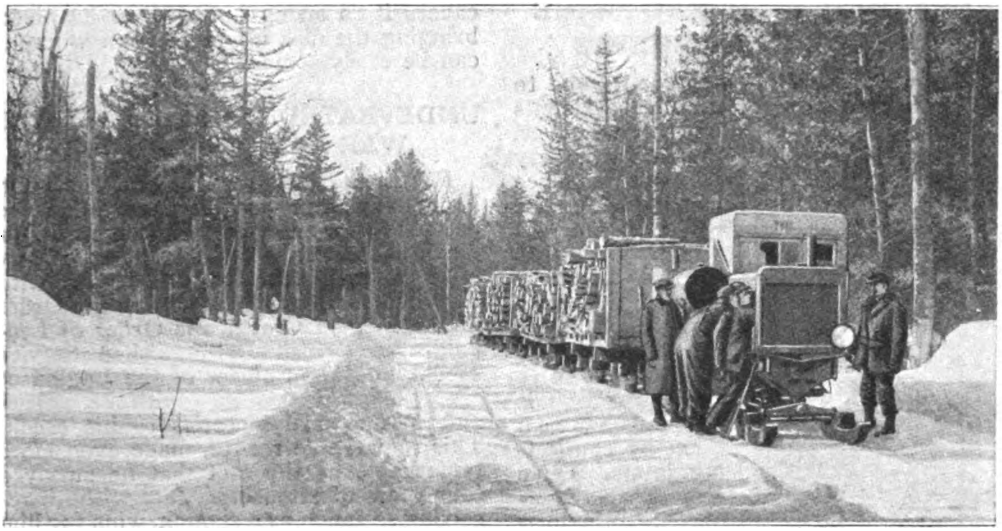
The shrimps, many of which are 6 in. long, are carried in dugouts to a drying wharf, where they are cooked in water and then dried. The cooking apparatus consists of large brick ovens, arranged in a row under a thatched roof, and on each oven is set a sort of brick boiler in which the shrimps are boiled until they assume a dark reddish color. After being boiled they are spread on the ground, for the most part with their shells still on. In fair weather they dry in the sun in three or four days, but in rainy weather they are dried under cover. Long sticks or rakes are used to stir them up from time to time. Naturally, little regard for cleanliness is shown. In the same waters in which the shrimps are caught there is a great variety of fish, the catching of which is largely conducted by the Chinese living on the coast. Shark fishing is carried on extensively, as shark fins are regarded as a great delicacy by these orientals. Neither the fish industry nor the shrimp industry has been seriously interfered with by the successive revolutionary disturbances in Mexico.

YANKEE AIRMAN LOOKS DOWN BLAZING CANNON BARREL

In flying close to the ground within the American lines on returning from a scouting expedition over enemy positions in the Meuse-Argonne sector shortly before the conclusion of hostilities, a Yankee aeroplane was violently rocked by a blast from a concealed artillery battery a few yards below. The pilot's experience was most unusual, not to say harrowing. Seeking a headquarters post where he might drop a message, the airman inadvertently drove over the yawning muzzle of a cannon at the instant it belched flame and projectile. Not only did the shell miss the aeroplane by a hairbreadth, but the terrific force of the expanding gases tossed the aeroplane about like a floating piece of paper. The machine passed through the curling smoke ring out of control and the pilot tasted the hot fumes of burned powder. Luckily, however, he regained control of the craft in time to prevent a crash, and came out of the situation none the worse for his unenviable experience.

CRAFT USED IN COAST PATROL RETURNED TO OWNERS

With the coming of peace the secretary of the navy ordered that yachts and motorboats which were operated by private individuals before the war and served as a part of the submarine patrol, be returned to their owners. Many of these were luxuriously appointed craft which were rented to the government for $1 per year. The order specifies that boats which have been injured in war service shall be put in good repair or compensation paid the owners.

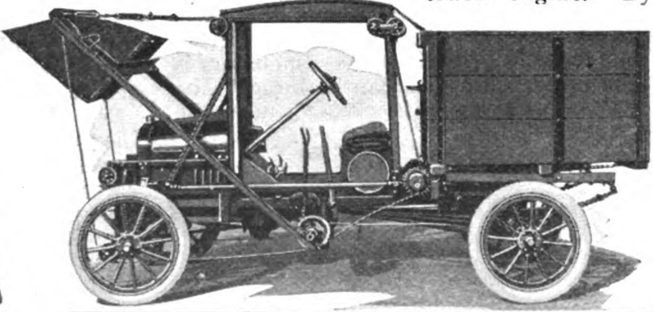


TRACTOR PULLS LOG TRAIN ON BOULEVARD OF SNOW

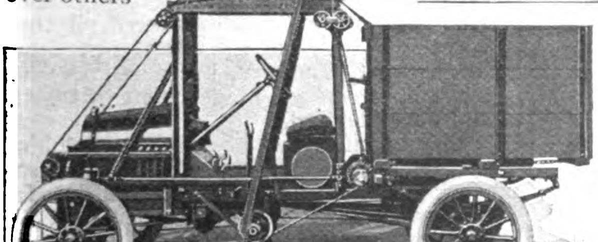
EXTENDING through Aroostook County in the Maine woods, there is a broad roadway, 45 miles in length, over which log trains on runners are pulled by tractors as long as the winter snows remain on the ground. This magnificent frozen avenue of white is 160 ft. in width and passes through forest land of perpetual green in one of America's most picturesque regions. The photograph reproduced herewith well portrays the solemn majesty of the woods and gives an interesting glimpse of one of the tractor-drawn trains.

DETACHABLE POWER SHOVEL FOR ANY AUTO TRUCK

A power shovel which can be attached to any motor truck is a new invention that greatly lessens the labor of loading bulk materials. The shovel proper is mounted on two steel arms which can be pivotally attached to either side of the chassis frame. A pair of cables, wound around drums fixed back of the driver's seat, pass over pulleys near the top of the cab, over others at the front of the car, and thence back to the drums, which are driven by the truck engine. By this means the loaded shovel is lifted from the ground and swung up over the cab, in which position it discharges into the body.



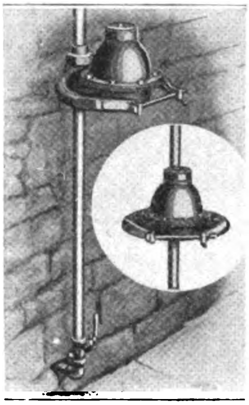
Auto Truck with a Detachable Shovel Operated by the Automobile Engine



The Shovel is Raised and Lowered by Two Steel Cables Which Pass around Drums Located behind the Driver's Seat

¶Hereafter, interchangeable gloves are to be supplied to our troops instead of right and left gloves, each article being knitted so that the front and back are identical.

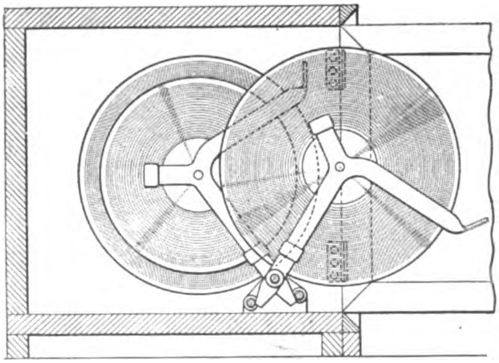
NEW METER-HOLDING FRAME FOR USE IN BASEMENTS



The advantages claimed for a yoke to hold water meters, installed in basements on vertical pipes, are that it is easy to put in place and it relieves the meter frame of strain. It consists of two hollow curved arms through which the water flows to and from the meter, which is held between them by connecting joints. One arm is also connected to the lower section of the vertical pipe while the other one, through which the water passes after it has been measured, is connected to the upper section of the pipe.

PHONOGRAPH-RECORD CABINET HAS HANDY NEW FEATURE

A phonograph-record filing cabinet of new design is equipped with elbow-shaped holders which support the disks side by side in small space. Projecting from the side of each of these members is a pin on which a disk can be hung. The lower arm of each is pivoted near the bottom of the cabinet, while the other arm projects in front and bears an index number or name. A slight pull on the holder causes it to swing outward on its pivot, bringing the disk into a position where it can be easily removed.



Cross Section of New Phonograph-Record Cabinet, Showing Two of the Elbow-Shaped Holders, One in Its Normal Position, and the Other Swung Forward So That the Disk can be Easily Removed

UNDEFEATED FRENCH BOY ENDS WAR ACE OF ALL ACES

To Lieutenant René Fonck, of the French aviation service, have fallen the palms of supreme victory in the air. This much-decorated young officer—he is barely 21 and wears the Croix de Guerre with 19 palms, the Médaille Militaire, the Order of the Belgian Crown, the Order of Leopold, the British Distinguished Service Medal, and is an officer of the Legion of Honor—ended the war with 75 official and 40 unofficial victories to his credit. This remarkable record, made even more remarkable by the fact that he survived four years of intense warfare without receiving so much as a scratch, wins for him the title of Ace of All Aces, allied and enemy.

If one-half of the stories told about Lieutenant Fonck are true, he is without question one of the most romantic figures in the history of the world's warriors. Military aeronautics at least has brought forth no personality more interesting or remarkable than this killer of flying Huns.

Fonck at 16 was a pupil of the famous Pégoud. He entered the service at the outset of the war as an observer. In 1916 he became a fighting pilot. When the illustrious Guynemer fell during an encounter with the Hun Wisseman, it was Fonck who climbed aloft and avenged his death.

No airman comes to mind with whom Lieutenant Fonck can properly be compared. He won his laurels by cool, deliberate, methodical fighting. A master with the "joy stick," a dead shot with the machine gun, a veritable Foch in strategy, and a second Hawkeye in fearlessness, he battled with such unemotional finesse and system that he never once suffered defeat. He was not the reckless daredevil that Guynemer was, nor a brilliant performer like the late Lufbery, but a fellow who made little display, judged his cards well, and never bluffed.

Lieutenant Fonck's tactics netted him six Hun planes in one illustrious day's work at an expense of only 56 bullets. In his fastest fight, on another occasion, he downed three enemy planes in 20 seconds.

ℭAnnouncement was made recently of the formation of the North China Motor Club with headquarters at Tientsin.

POPULAR MECHANICS
MAGAZINE

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REG. U.S. PAT. OFF.

How many boats can you see?
Page 217

Learn Auto and Tractor Business

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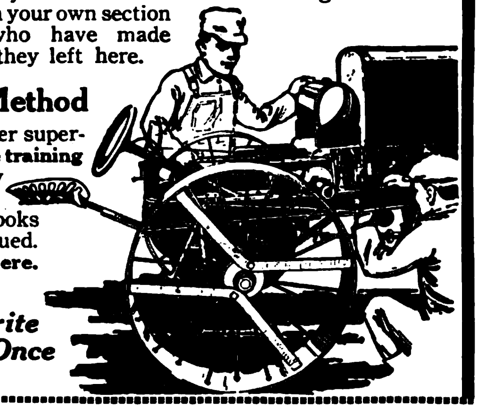

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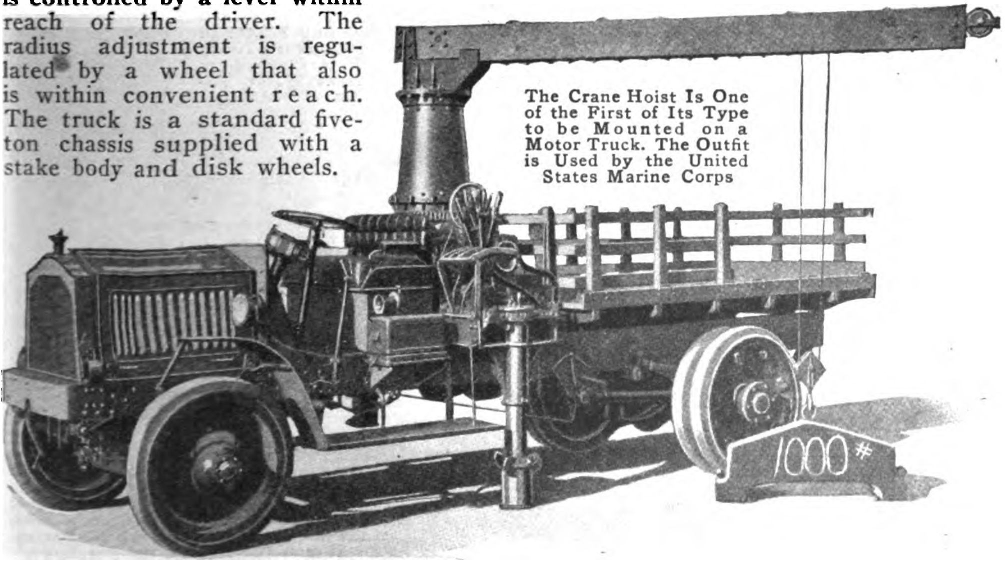
SALT HAM HELPS NAVY ELEVEN WIN ON GRIDIRON

To very salt ham, served once a week, sailors in training on Chicago's municipal pier give a large share of credit for their football team's phenomenal success the past season. Football experts, who know the rigid discipline under which the navy men live and their rather monotonous diet, on hearing that the navy eleven was to have a season a month longer than is usual, predicted that the team would "go stale." But the commissary steward, once a player himself, believed he could keep the men in good fettle despite this handicap. His plan was to serve very salt ham once a week, causing the players to drink quantities of water. In the opinion of those who ventured thus to disregard conventional training rules, this kept the men from "going stale" by relieving their systems of congestion. The team's victories are pointed to as a vindication of the diet.

CRANE IS MOUNTED ON TRUCK USED BY MARINE CORPS

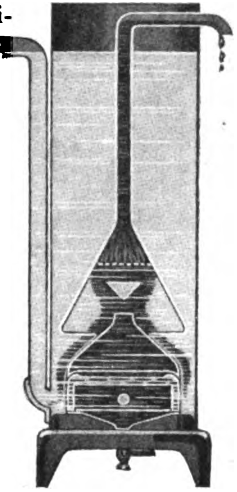
Included in the motor equipment of the United States Marine Corps is a specially outfitted truck that mounts a crane hoist with a 10-ft. boom. Jacks are provided at opposite sides of the chassis to relieve the frame of undue strains. Working at a radius of about seven and a half feet, the hoist has a lifting capacity of two tons. It is operated by a power take-off which is controlled by a lever within reach of the driver. The radius adjustment is regulated by a wheel that also is within convenient reach. The truck is a standard five-ton chassis supplied with a stake body and disk wheels.



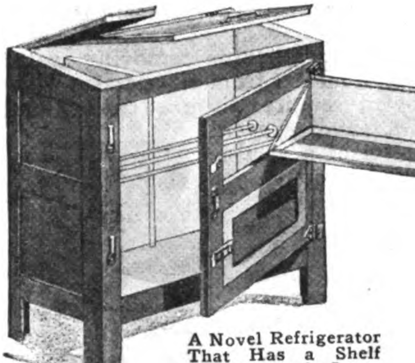
The Crane Hoist Is One of the First of Its Type to be Mounted on a Motor Truck. The Outfit is Used by the United States Marine Corps

COMPACT OIL SEPARATOR OPERATES BY GRAVITY

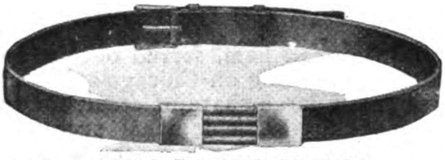
A new separator for removing water and foreign matter from oil operates without power, requires little attention, and occupies small space. It consists of a vertical cylinder containing especially arranged baffles. The oil enters near the bottom and flows into a circular guide designed to allow the solid matter to settle to the bottom, whence it can be drawn off. As the cylinder fills, the oil and water pass up through an opening in the top of a conical cover over the guide. The oil, being the lighter, accumulates in a second conical baffle, suspended above the one just mentioned, and, as the level of the water rises, passes off through a pipe which is an extension of the cone. A second outlet, for the water, is connected at the bottom of the separator and rises to the level at which it is desired to maintain the water within. If further cleansing of oil which has passed through the separator is desired, a series of filter pads is used.



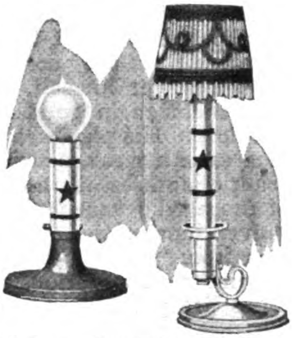
SOME NOVEL AND LITTLE-KNOWN ACCESSORIES



A Novel Refrigerator That Has a Shelf Attached to the Inner Face of a Door within a Door

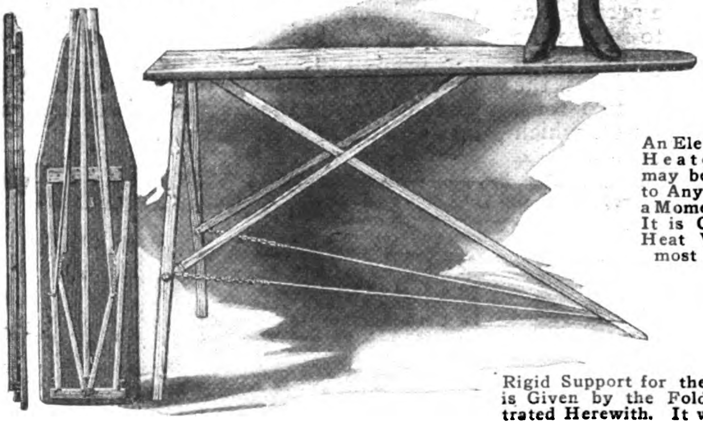


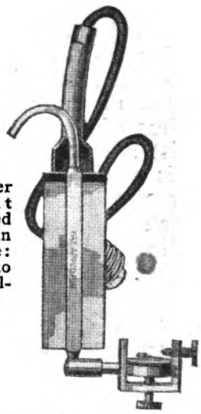
Men's Belt, Made Elastic by Insertion of Four Coiled Piano-Wire Springs at Rear



Quite an Appropriate Memento of the War, for Those Who Have a Relative in the Service, Is the Service-Star Candlestick, Two Forms of Which are Shown

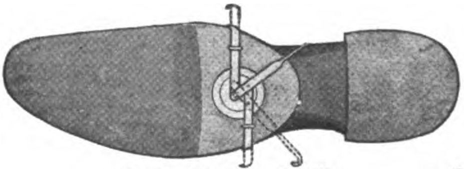
An Unusual Souvenir for Patriotic Functions—a China Bee Decorated in Red, White, and Blue. It may be Worn on a Coat Lapel or Pinned to a Place Card



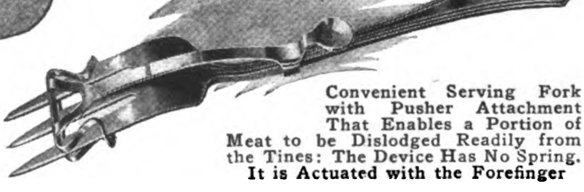


An Electric Water Heater That may be Attached to Any Faucet in a Moment's Time: It is Claimed to Heat Water Almost Instantly

Rigid Support for the Ironing Board is Given by the Folding Rack Illustrated Herewith. It will be Observed That Plenty of Open Space is Provided beneath the Board at the Small End



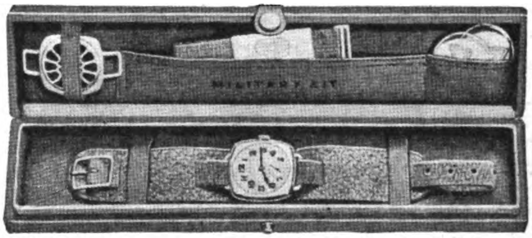
Many Persons Dislike Wearing Clumsy Rubber Shoes in Rainy Weather. For Them the Rubber Sole with a Mechanical Clamp, Here Shown, is Especially Intended



Convenient Serving Fork with Pusher Attachment That Enables a Portion of Meat to be Dislodged Readily from the Tines: The Device Has No Spring. It is Actuated with the Forefinger

INTENDED FOR THE HOME AND ITS MEMBERS

An Economical Oven That Fits in the Doorway of a Furnace and Utilizes the Latter's Heat, Thereby Obviating Necessity of Using a Range



For the Man in the Service: A Wrist-Watch Set with an Extra Strap, Two Extra Crystals, and a Crystal Guard

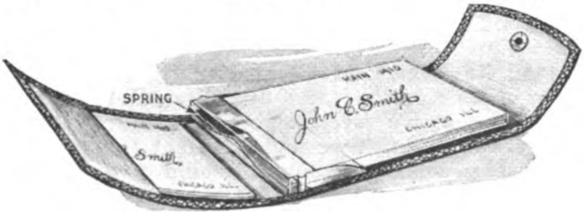
Patriotic Emblem for Coat Lapel, Framing Miniature Portrait of Soldier: The Eagle Is Gold Plated and the Flag Enameled in Colors

This Military Wrist Watch Includes a Small Compass, Obviously of Convenience to the Soldier or Sportsman

For the Modern Kitchen: Five Separate Wall Racks Holding Moisture-Proof Glass Jars of Different Capacities, Each Instantly Removable

Suburbanites Whose Telephone Calls Are Frequently Long-Distance Ones will Find This Three-Minute Sandglass a Most Convenient Accessory

Here Is a Screen That may be Rolled Like a Window Shade, a Feature That Meets the Storage Problem in Winter and Also Simplifies Window Washing in Summer



This Case is Supplied with a Spring Clamp That Holds One's Unbound Business and Visiting Cards in Book Form and Permits Them to be Removed One at a Time, without Disturbing the Pack

FROM A GERMAN PRISON TO THE ARCTIC

By ALFRED L. FLUDE

LAST summer, in Mourmansk, Russian Lapland, I met Harry Drope, of Brandon, Manitoba, formerly a member of the Princess Pat Regiment. He had escaped from a German prison camp into Russia, and at last into the Arctic on his way back to England, where he once more reported for duty. This is the way he told his story while we were sitting on a lifeboat on the well deck of H. M. T. "The Czar," carrying 1,300 refugees, who had escaped from all over Russia, down to England.

"I was captured in 1915 and sent to a German prison camp, where the food was very bad and the work was very hard."

"I was captured in 1915 and sent to a German prison camp where the food was very bad and the work was very hard. The worst time in the life of a prisoner under the Germans is those first weeks before the Red Cross locates him and sends him enough food to keep body and soul together. We were given a few ounces of black bread daily and a bowl of soup with no food value, and which smelled so badly that it was simply impossible to eat it.

"Within a few weeks I was transferred to a camp in German Poland, where we were employed in rebuilding the villages which had been destroyed by the Russians. It was good outdoor work, and as soon as my food packages came regularly, I thrived on it. I determined to escape into Russia, however, and planned with two Russian soldiers for the attempt. For several weeks we saved a portion of our food each day until we had sufficient for two weeks, which we thought would give us time enough for the trip. When the time came, we managed to hide behind the huge oven in the bakery, when the others returned to the barracks. At 10 o'clock we started, depending on the stars to guide our course due east. Before daylight we hid in a field of barley and remained there for the entire day. This was our procedure during the entire trip.

"At the end of two weeks our food was exhausted, but we were far from the Russian lines. We went to the home of a Polish peasant, waked him, and told him we must have food. He gave us potatoes and black bread, and promised not to tell of our visit. However, we made it a rule to make these visits before midnight so we would have a good start before we could be reported to the military. We were never refused, and many of the poor people gave gladly and wished us success.

"Just as we were congratulating ourselves that the journey would soon be over, we walked right into the arms of a German sentry and were promptly arrested by him. However, three prisoners at one time were more than he could master, and before he realized what had happened, there was a mix-up in the dark, and two of us were running through the underbrush into the forest. He kept firm hold on one of the Russians, however, and that was the last we ever saw of him.

"Twenty-six days from the time we started, we reached the trenches. The Germans were on one side of a river and the Russians on the other. The German lines were well guarded and were further protected by barbed-wire entanglements, heavily charged with electricity. As we crawled along the line, we could see in the moonlight the bodies of Russians who had attempted to go through. We were hiding in a huge shell hole close by the bridge, upon which we could see a German sentry walking. Suddenly we heard the clatter of a pony and cart crossing from the Russian side. We heard a man call to the sentry in Yiddish and finally come on toward the German side. My companion, who was a Russian Jew, called to the driver cautiously, in Yiddish. The pony was stopped and the man came toward us. He listened to the story, gave us some black bread from his cart, and asked us if we had any money. We offered him all we had, about 14 marks. 'That is too much,' he said. 'Give me seven marks.' He signed for us to follow and walked boldly back across the bridge, calling to the guard that he had forgotten to give him some cigarettes. As we drew near he told the guard that he had met two Yiddish friends who wished to go back to the Russian side, at the same time handing him the cigarettes and the money. The sentry waved us on and we walked slowly past him toward freedom. Up and down my back the chills were running, and I wondered how soon and where his bullet would strike, for I could hardly believe that he would be so easy. At last we reached the other side, and took to our heels into the shadows and were safe.

"After that it was simply a question of getting through the Bolshevik lines and into the North. Here my Russian companion was of inestimable help. At last I reached the Petrograd-Mourmansk Railroad and followed it until at last I reached the English-Serbian lines and went into Mourmansk on a real freight train. Why speak now of the hardships of the whole trip? I forget them and regard myself as unusually fortunate in having escaped.

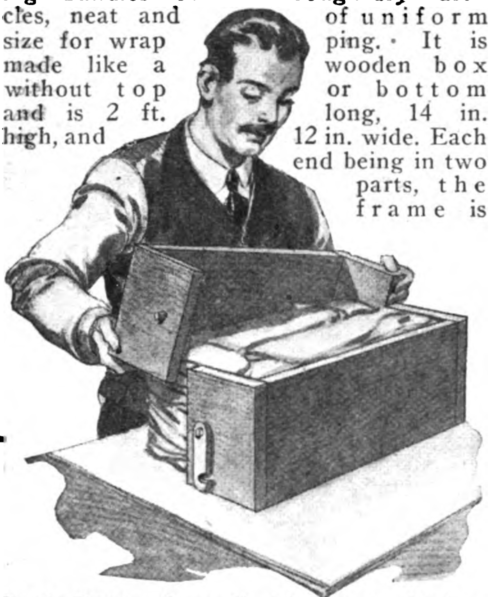
"Before he realized what had happened, there was a mix-up in the dark, and two of us were running through the underbrush into the forest."

"I am going back to London to report and will probably be at the front again in less than a month. I hope the war will not end until I have had my chance to repay the Hun for what he made me and others suffer as prisoners. I wish I knew how that other Russian fared!"

"As we drew near he told the guard that he had met two Yiddish friends who wished to go back to the Russian side, at the same time handing him the cigarettes and the money. The sentry waved us on and we walked slowly past him toward freedom."

FRAME AIDS LAUNDRY WORKERS IN WRAPPING BUNDLES

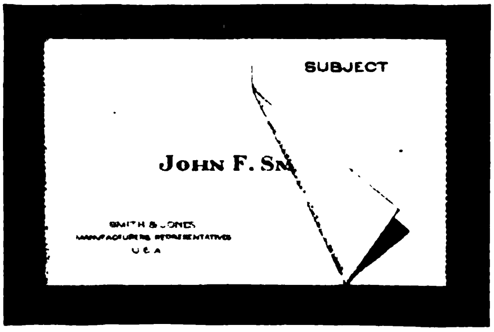
A convenient accessory for commercial laundries is a wooden frame used in making bundles of rough-dry articles, neat and of uniform size for wrapping. It is made like a wooden box without top or bottom and is 2 ft. long, 14 in. high, and 12 in. wide. Each end being in two parts, the frame is divided into halves which are held together by simple clamps, dowel pins helping to keep them in alinement. The frame is placed on the wrapping paper and the laundered material is packed into it, after which the halves are removed.



Handy Wooden Frame Used by Laundry Workers as a Form in Which Articles are Piled Preparatory to Wrapping Them into Bundles of Uniform Size

BUSINESS CARD WITH FLAP FOR BRIEF MESSAGE

Convention has been departed from in designing a business card which is provided with a flap intended to be folded either against the back or the front of the main portion of the card. At the top of the flap is the word "subject," beneath which the one seeking an interview can indicate in a few words the nature of his errand and thereby can often save time for himself and others concerned.

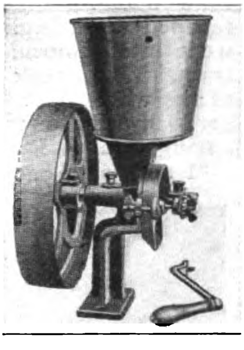


Business Card with a Detachable Flap on Which can be Written a Brief Message to the Person with Whom an Interview is Sought

NEW YORK TO ERECT ARCH AS WAR MEMORIAL

Very soon after the coming of peace New York City officials began making plans for a victory arch in honor of the Americans who fought in the great war. The proposal is to determine as soon as possible the general character of the structure and then erect a temporary arch in conformity with those ideas, before the majority of the troops return home. A number of prominent artists and architects have been selected to draw up plans and specifications. The board of aldermen has authorized the issuance of $80,000 in special revenue bonds with which the memorial will be erected on Fifth Avenue, at Madison Square.

EASILY OPERATED FLOUR MILL FOR HOUSEHOLD USE



It is believed that the war has created a demand for home-ground flours of various degrees of coarseness, which will be permanent among housewives. To meet this demand a small hand-operated mill, moderately priced, has been placed on the market. It fastens to the edge of a table and stands 19 in. high. A crank handle and a small flywheel make its rapid operation easy. The two grinding burrs are easily adjusted by a thumbscrew for grinding corn, wheat, barley, rice, rye, etc., to the desired degree of fineness.

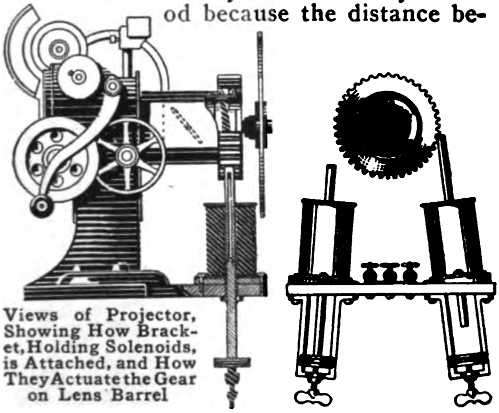
ℭ Business interests in Tokyo, Japan, are planning extensive development of the port at Ominato, which is now only a small naval center at the northern end of the largest of the empire's islands, but promises to become an important transshipment point between the United States and northern Asia.

OVERCHARGING FOR HOTEL-PHONE SERVICE ENDS

One of the petty overcharges which have annoyed hotel guests in many large cities has been abolished by an order from the postmaster-general, who has control of the telephone systems of the country. This order provides that hereafter hotels, apartment houses, clubs, and similar institutions, shall not charge any guest or member more for the use of the telephone than is charged in public pay stations. The managements of these places are also forbidden to charge more for private-branch exchange stations than they, in turn, are required to pay.

FOCUSING MOVIE PROJECTOR FROM BODY OF THEATER

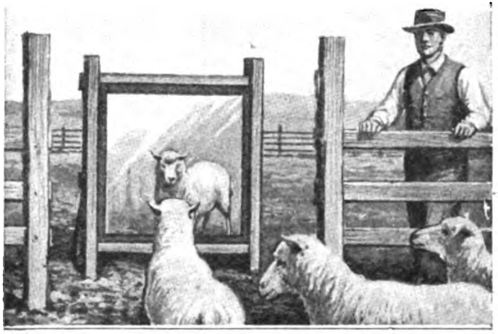
Among the recent inventions intended to improve the projection of moving pictures, there is an electric focusing system that may be controlled from any part of a theater. Usually the lens of a projector is focused manually, but in large houses this is not always a satisfactory method because the distance between the projection booth and the screen makes it difficult for an operator to determine the sharpness of a picture. The latest plan for obviating this trouble consists in fitting a ring gear over the milled bead that rotates the lens barrel, and actuating the former by means of two solenoids connected in a three-wire circuit controlled by a pair of push buttons, preferably installed in the middle of the theater about 14 ft. from the screen. An operator stationed at this point is able to watch the screen and refocus the lens when needed, by pressing one or the other of the push buttons. The latter control separate solenoids, one causing the lens barrel to be moved forward, and the other backward.



Views of Projector, Showing How Bracket, Holding Solenoids, is Attached, and How They Actuate the Gear on Lens Barrel

SHEEP DRIVEN INTO PEN WITH AID OF MIRROR

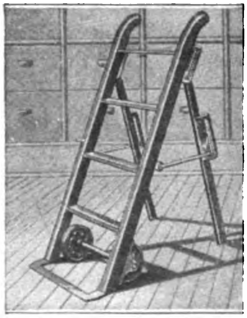
By placing a mirror, 3 ft. square, opposite the opening through which sheep were to be driven, an Australian grower has been able to get the animals to pass into pens where they were wanted, without difficulty. True to its well-known habit of following the lead of its fellows, each sheep on seeing its own likeness in the mirror thought it was another of the flock and passed through the opening at once. While the device has been employed only as indicated and by but one ranchman, so far as is known, doubtless there are many places where it could be used.



A Mirror Installed Opposite the Entrance to a Sheep Pen Makes the Animals More Ready to Enter the Gate, Because Each Takes His Reflection to Be Another Sheep Already in the Inclosure

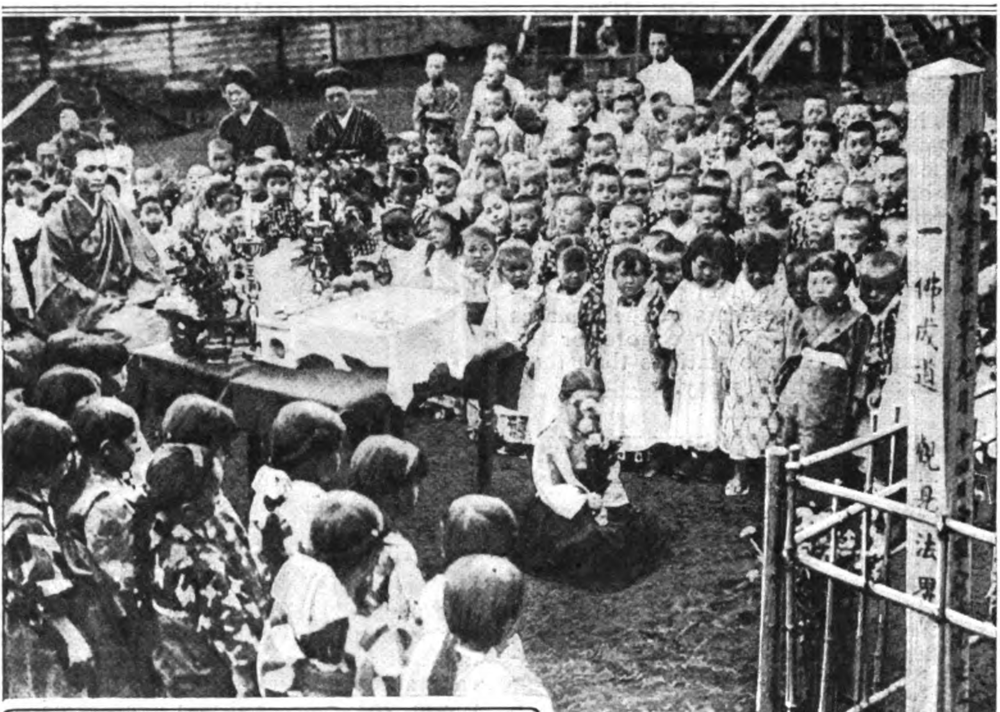
STEPLADDER AND HAND TRUCK ARE COMBINED BY INVENTOR

A hand truck that also serves as a stepladder has recently been invented. The device is fitted with four treads and at the rear side has a hinged support that fits in front of the axle, out of the way, when not in use. An additional advantage of the combination is that the support will hold the truck in loading position and thereby give the operator complete freedom when tipping or moving a heavy crate or barrel.



¶A few weeks ago a huge aeroplane carrying 35 passengers flew to Paris and return from a point 40 miles distant.

VARIOUS ACTIVITIES OF BOYS AND GIRLS,



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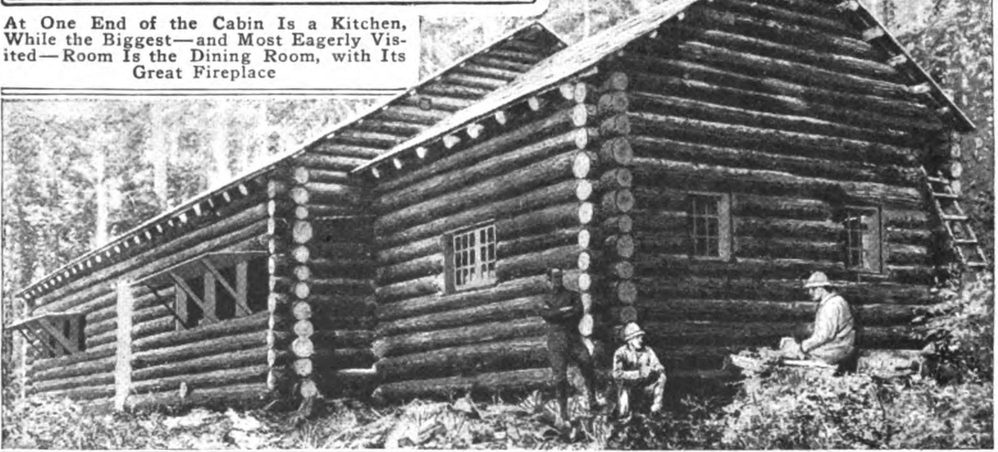
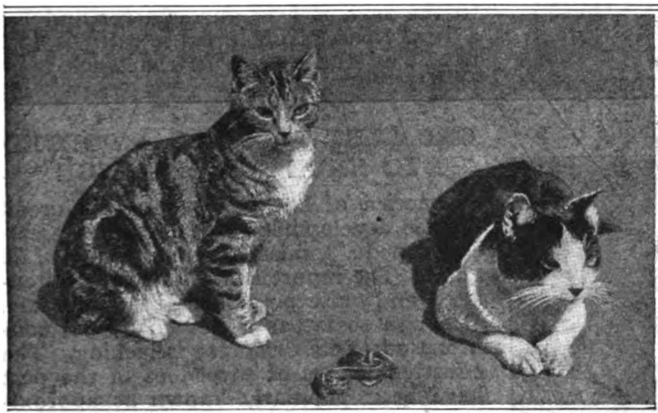
Little Children in Japan are Wonderfully Devoted to Their Dolls, and When the Time Comes to Discard Any of Them, Something Like a Funeral is Held. This Picture Shows the Oriental Little Folk from One of the Japanese Elementary Schools Attending One of These Sad Gatherings

At One End of the Cabin Is a Kitchen, While the Biggest—and Most Eagerly Visited—Room Is the Dining Room, with Its Great Fireplace

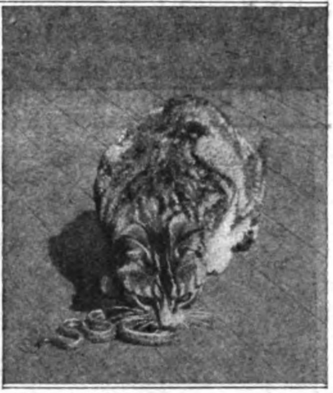


About 60 Miles from Their Home City, the Boy Scouts of Portland, Oregon, have Built This Splendid Log Cabin near Wahtum Lake, on Leased Land in the Oregon National Forest. The Building Measures 100 by 50 Feet and is Made of Peeled Silver-Fir Logs. As can be Easily Imagined, It Is the Goal of Many a Memorable Hike Taken over One of Two Beautiful Trails, Which are Maintained by Forest Rangers

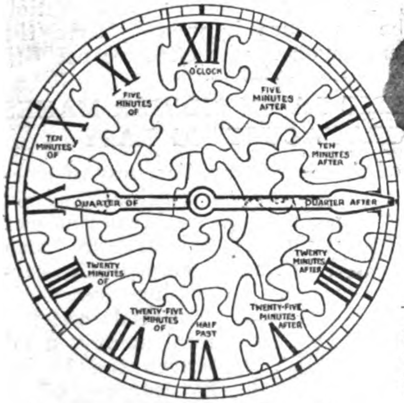
AND UNUSUAL SCENES OF INTEREST TO THEM



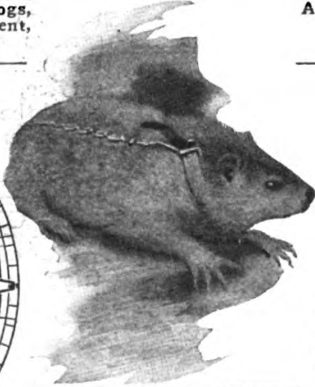
There Is No Accounting for the Taste of Cats. Here Is Tommy, for Example, a Perfectly Nice Connecticut Puss, Who Went Out One Day and Brought Back a Snake for the Entertainment of His Tiger-Striped Daughter, Milly. Tommy's Master Believes That the Family Pet Started Out to Get Frogs, but, Coming upon This Snake by Accident, Simply could Not "Pass It Up"



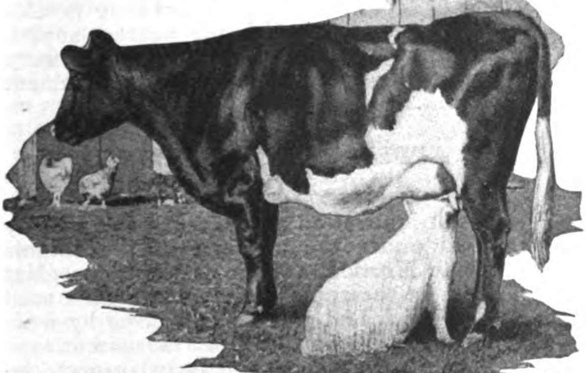
The Closest Call the Snake Ever Had: Milly Put Her Teeth into Him a Little Way, but did Not Like the Taste, and So, after Giving Him an Awful Scare, Let Him Crawl Away, Scot-Free



A Jig-Saw Puzzle That will Help a Child to Learn to Tell Time: On Each Piece is Shown the Value, in Minutes, of the Accompanying Numeral



A "Close Up" of Steve's Ground Hog, Which, He Says, Sleeps through the Winter until Ground-Hog Day, When He Comes Out to Look for His Shadow

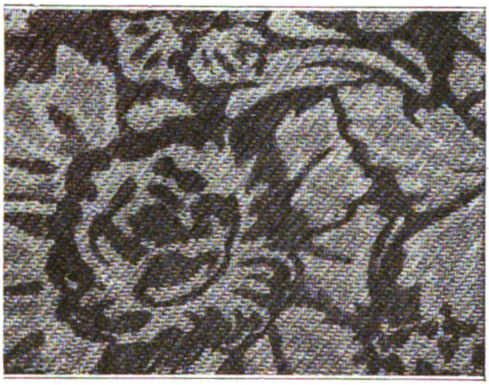


This Little Pig Never "Went to Market" or "Had Roast Beef," but He did Have Something He Liked Much Better, Namely, Milk from a Cow Which Nursed Him

In Rocky Hill, Connecticut, Everybody Knows Steve Reduker, the Boy Who Lost One Leg Over Three Years Ago, and They Like Him for His Pluck and Love of Pets, One of Which, His Ground Hog, is Shown with Him

GERMAN WAR-TIME CLOTH MADE OF PAPER

A war-time product of German weavers, reports of which excited not a little interest, was the so-called cloth made of paper. Photographs recently secured of specimens of this fabric show that it is very coarsely woven, the threads appearing to be as large as coarse wrapping twine. In some cases a pattern was printed or stenciled on the material. Undoubtedly a great deal of experimenting was necessary to make possible the production of even this rather crude cloth.



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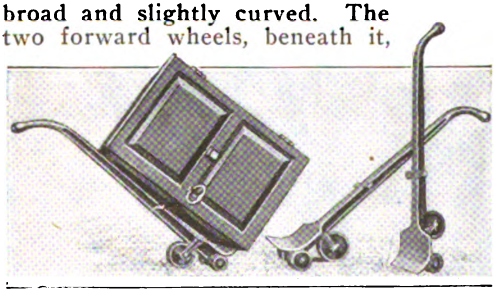
Specimen of a Substitute for Cloth Made by German Weavers during the War

NEW ALL-METAL HAND TRUCK A PINCH BAR ON WHEELS

A new hand truck for moving light or heavy loads with comparative ease resembles a large-size pinch bar, mounted on three wheels. The truck is made entirely of malleable cast iron, and there are no bolts or other parts apt to need replacing. The lower end, which is inserted under the article to be lifted, is broad and slightly curved. The two forward wheels, beneath it, have 2½-in. treads and are 3½ in. in diameter, while the third wheel, a few inches to the rear, is 5 in. in diameter and has a 1-in. tread. The leverage ratio is 13½ to 1, and the weight of the truck is 34 pounds.

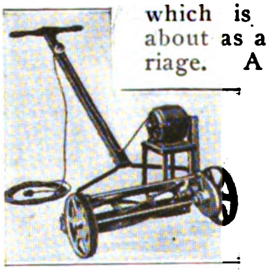


All-Metal Hand Truck Made Like a Pinch Bar; It will Stand Alone Vertically or at an Incline

GREATEST TORPEDO REPORTED TO HAVE 20-MILE RANGE

America of late has been given credit for the development of the world's greatest torpedo, a missile with a range of 20 miles. The report has been widely circulated and quite possibly is based on fact, although so far as is known official confirmation of its existence is lacking. The effective ranges of torpedoes in the past have been popularly known as approximately five miles for the largest size, and about three miles for others. The use of a torpedo against a target beyond the range of vision obviously would entail serious difficulties. Therefore, granting that a 20-mile torpedo has been placed in service, the details of its construction could be no more interesting than the means employed for its effective use.

ELECTRIC LAWN MOWER MAKES GRASS CUTTING EASY



One of the newest applications of electric motive power to machinery is a motor-driven lawn mower which is as easy to push about as an empty baby carriage. A ⅛-hp. motor is mounted on the implement and drives the blades by means of a belt, but does not propel the mower. Current is obtained through an extra long flexible cord connected with the nearest socket. The motor drives the cutting machinery while the operator pushes the implement about.

APPLE BARRELS PROVIDED WITH GLASS TOPS

An innovation at a recent apple display held under the auspices of the Illinois State Horticultural Society was the glass tops in the apple barrels. The glass used was thick and was held in place by nails in the usual way. These transparent tops made it very convenient to inspect the fruit whether the barrels were placed on end on the floor or piled in rows on their sides.

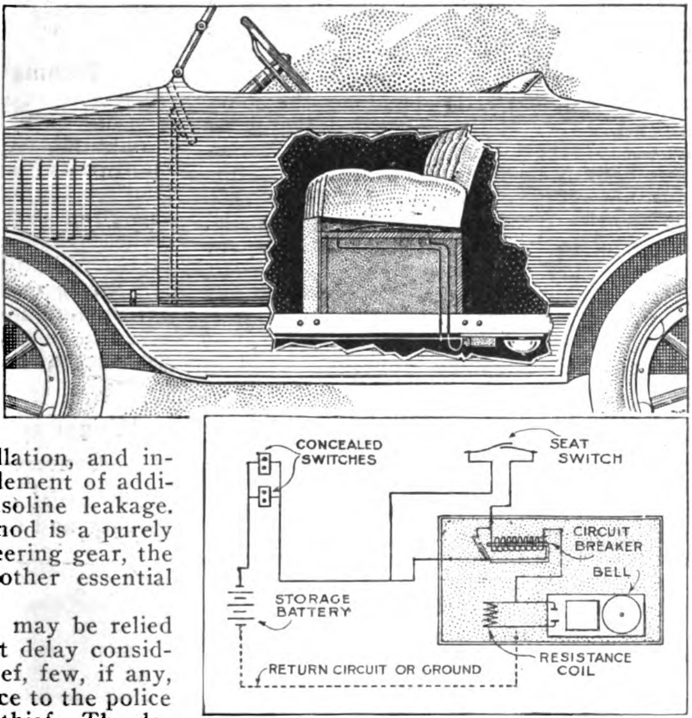
Automobile-Thief Alarm

By E. W. RANSTON

MANY good and efficient automobile locks have been called into existence by the epidemic of automobile thefts, and there is now no excuse for leaving a car unprotected. The locks in general use are of several classes, each presenting its own advantages and open to its own objections. Electrical locks for merely breaking the ignition circuit were the first on the scene, and are still used to some extent, although no expert automobile thief would be delayed by them for more than a few seconds, as he would simply connect around the "lock" with a wire leading directly from the battery to the igniter. Gasoline-line locks are useful, but somewhat complicated in their installation, and introduce the questionable element of additional opportunity for gasoline leakage. Probably the favorite method is a purely mechanical lock, on the steering gear, the starting crank, or some other essential part of the mechanism.

While all of these locks may be relied upon to prevent or at least delay considerably the work of the thief, few, if any, of them are of any assistance to the police in capturing the would-be thief. The device here described is intended to accomplish this purpose, and at the same time furnish a protective device with all the convenience of the ignition lock.

The effect of the contrivance is that, when a thief enters the car and takes his place in the driver's seat, an invisible alarm bell under the car starts ringing, and continues to ring even after the thief leaves his seat and seeks safety from the police or citizens who are sure to be attracted by the noise of the bell. The bell will continue to ring until the owner returns to the car, or until somebody finds the hidden control switch and turns it off. Of course, if the thief is ingenious enough to find this switch at once, he can turn off the alarm himself, but there is small chance of a thief working very long around a car to the accompaniment of a loudly clanging bell.



As the Thief Takes His Seat at the Steering Wheel, He Sets Going an Invisible Alarm Bell, Which Continues to Ring Until Switched Off by a Concealed Switch in Another Part of the Car

The various parts of the circuit and their connection are shown in the diagram. The materials needed are: one or more small switches to be concealed as well as possible within reach of the driver; a good, loud electric bell; a relay, or circuit breaker, such as is used on nearly all modern automobiles to connect the generator to the battery when the proper speed is reached; some resistance wire, large enough to carry several amperes of current, and some pieces of wood and spring brass to make the seat switch. As will be noted in the circuit diagram, when the concealed switch is closed and the seat switch is afterward closed, the circuit through the bell is established, and, at the same time, the current flowing through the circuit breaker closes a circuit which connects around the seat switch so that, even though the latter is open, the bell continues to ring. The resistance coil would not be necessary if the circuit through the bell was continuous. Since, however, it is interrupted at each tap of the bell, the coil is necessary, in order to maintain a sufficient current through the circuit breaker to keep it from permitting the shunt circuit across the seat switch to open, thus stopping the alarm. The only way in which the alarm can be stopped is by breaking the main circuit, either at the concealed switch or at some other point. If properly wired, this cannot be done by a stranger without spending considerable time, which, under the circumstances, is out of the question for a thief, at least in a city or town.

The making of the seat switch will not be difficult for any electrical experimenter, and its successful working must, of course, be tested by experiment. The sketch may give a suggestion. It will be advisable to carry the two wires from the seat switch directly down below the car, where the circuit breaker, bell, and resistance coil can readily be mounted in one removable unit. As the current first comes through the seat switch, it will close the contact points; as the seat switch is opened, the current flows through the shunt circuit, including the contact points, and keeps the points closed until the main circuit is broken.

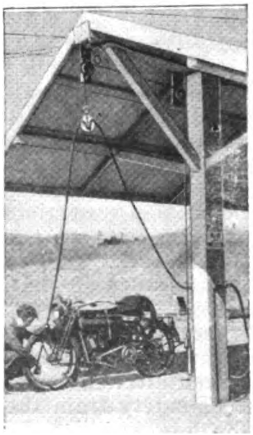
The unit under the car, consisting of the bell, circuit breaker, and resistance coil, will have two wires leading from it: one to the seat switch and one to the concealed switch. If the car is wired on the double-wire system, there will also have to be a return wire to the battery. With the grounded-battery system, there is simply a connection from the unit under the car to some screw or nut on the frame of the car.

The concealed switch may be located in a pocket on the door, just behind the dash board, under a corner of the floor mat, or any other place where it will be out of sight; or it may be built into a combination, or key, lock. Ignition locks designed for use with magnetos, which have a closed circuit when locked, are readily used for this purpose. One advantage to be gained by the concealed-switch idea, however, is that there is no visible indication that the car is locked, thus encouraging the thief to get himself trapped. Car owners who regard this as a disadvantage, preferring to notify the thief in advance that the car is protected, may use a lock switch. If the thief then connects across the two wires leading to it before taking his seat at the wheel, he will not have prevented the gong from giving the alarm. Using two or more concealed switches presents an additional advantage, as closing any one of them throws on the alarm, and all must be open to throw it off.

Etching on Glass and Metal with a Sandblast

A sandblast may be made use of in many novel ways. Any part of an electric-light bulb may be frosted by covering the other part of the glass with a piece of heavy paper, and exposing to the sandblast. A similar process will serve to etch any lettering or design on any glass or polished-metal article, and a finish may be given to soft wood which gives it the appearance of being hand-engraved.

Weight and Pulleys Keep Air Hose Convenient and Reduce Wear



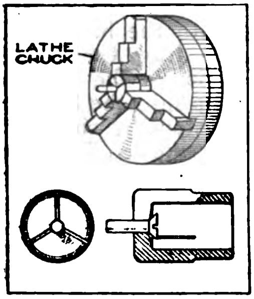
The usual air-hose arrangement about garages and service stations is frequently a source of annoyance to both motorists and attendants alike, and when the hose is dragged about on the ground, it is very short-lived. The weight-and-pulley mounting, illustrated in the accompanying photograph, keeps the hose up out of the dirt at all times. Its position is convenient for getting at all four wheels of a car; it is in the shade, and is not needlessly worn by being dragged out over the ground or left in a position to be run over by machines. This type of hose support costs little to install, and will pay for itself many times by the convenient service it renders and the reduced wear on the hose.—John Edwin Hogg, Alhambra, California.

Moving "Rusted-In" Screws

Steel screws which have rusted into place are difficult to remove. They can often be loosened by tapping the screwdriver with a hammer, or by heating, but a better way is to treat them before setting them in place with a rust preventive. Common oil will do this to a slight extent, but a mixture of graphite and tallow rubbed onto the screw, will be effective for a much longer time.—S. Leonard Bastin, Bournemouth, Eng.

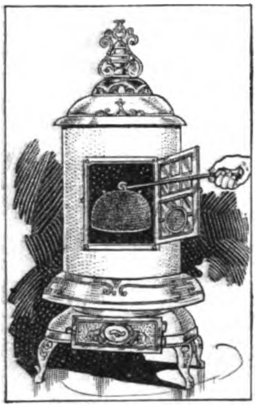
Holding Screws While Threading or Turning Them

When small screws must be turned or threaded in the lathe, time is often lost because no chuck is at hand which fits the screw. A collet, to be held in the chuck, and to hold securely the size of screw for which it is designed, is made from a piece of round steel. It should be about 1⅛ in. in diameter, and its length should be somewhat greater. Drill a hole clear through it, the size of the screw to be held; then, from one end, ream this with a ¾-in. drill, to within ¼ in. of the other end. Turn down slightly the half of the piece from which the ¾-in. hole was started, so as to provide clearance. With a hacksaw, saw three or four slots, as shown, so as to form a spring collet. The number of slots should be the same as the number of jaws in the lathe chuck. The collet may be hardened, or casehardened if convenient, and its life will then be much longer. If the collet is accurately made, a universal chuck will be satisfactory to use with it; for extreme accuracy, however, which is often necessary in small work, the chuck with independent jaws is to be preferred.—E. L. Howard, Springfield, Ohio.



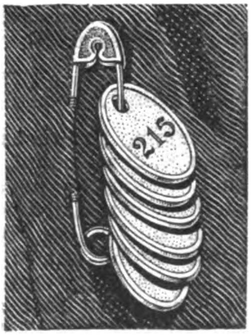
Large Kettle Inverted over Soft-Coal Fire Saves Heat

On putting fresh soft coal into a stove, an intense smoke is given off, which fouls the pipes and spreads soot over the room, besides wasting coal. A means for diminishing this was found in a large iron pot. The pot was provided with a ring on the bottom, by means of which it could be carried on the end of the poker. Immediately after putting on fresh coal, the inverted pot was set on top of the fire and was found to have the effect of causing the smoke and coal dust either to collect inside the pot or to escape around the edge, where the gas would burst into a ring of flame, consuming much of the coal dust, which would otherwise be wasted. The kettle is left on until the fresh coal becomes hot and is reduced to coke by having the gas roasted out of it; the pot is then removed, leaving a coke fire, which burns and lasts very well.—A. S. Thomas, Amherstburg, Ontario, Can.



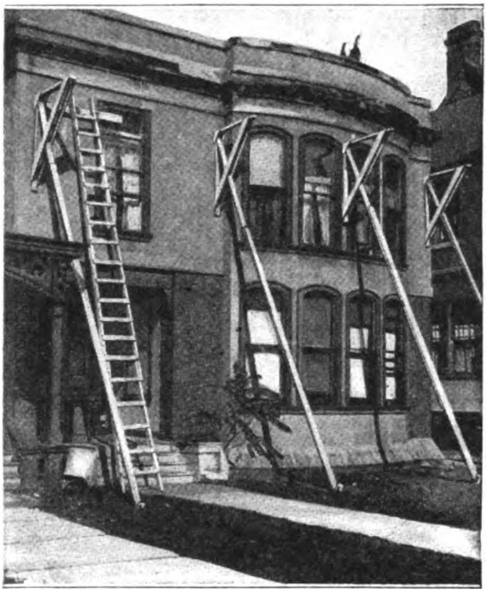
Carry Tool Checks on a Safety Pin

In shops where each workman has a number of tool checks bearing a number, one of which he deposits in the tool room as a receipt for a tool taken out, the loss of these checks may sometimes involve unpleasantness. A safer way of carrying them than in the pocket is to sew a large, strong safety pin to the overalls or shop clothes and hang the checks upon it. The checks can be removed or replaced with either hand, so that the other one is left free for carrying the tools.—C. C. Spreen, Detroit, Mich.



Scaffolding without Nails

On a repair job where the scaffolding could not be attached to the side of the house, and it was not desired to build up a whole structure from the ground, a contractor designed a number of brackets, which enabled him to get at the work conveniently and safely after very little preparation. The brackets were made of 2 by 4-in. scantlings, each brace consisting of two pieces nailed together so that the central portion, where the greatest stiffness is required, is full 4 by 4 in. The braces fit snugly into the brackets, and the whole scaffolding can be removed in a few minutes and carried to another job.—W. K. Crosson, Detroit, Mich.



Brackets for Scaffolding Supported by Long Braces Reaching to the Ground are Found Useful on Repair Jobs

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Keeping Brushes Soft with Paraffin

Keeping paintbrushes soft by placing them under alcohol, turpentine, or other such liquids, is a somewhat expensive method, especially when the brushes are to be out of use for long periods. If a brush which is still moist with paint or shellac is dipped in melted paraffin several times, so that a heavy coat of the paraffin adheres to it, the brush will retain its softness indefinitely, the paraffin preventing any evaporation. To remove the paraffin, merely pull it off; it will come easily, leaving the brush as fresh as when the paraffin was applied to it.

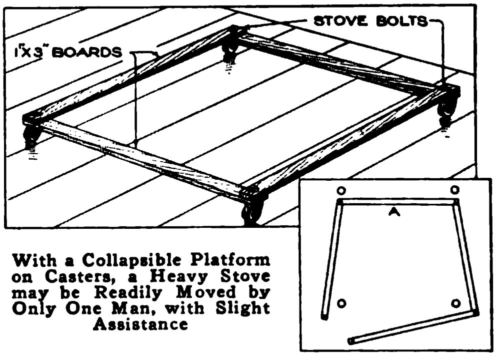
Keep the Lamps Clean

A simple explanation of a gradually failing light in many shops is to be found in that lamp globes and shades are not kept clean and, therefore, do not transmit or reflect the light properly. A little attention to keeping the lamps clean will often enable a shop to avoid the necessity of installing more lights or to have much better illumination with those already installed.—William Philip, Bloomfield, N. J.

Small Truck Aids in Moving Stove

Here is a device that is cheap and easily made, and will enable one grown person, with the help of a child, to move quite a large stove. The frame, of strips, 1 by 3 in., is bolted at three corners with 1/4-in. stove bolts, and casters are fastened beneath with screws. In the fourth corner the bolt is first put through the upper board only, and the nut put on to hold it firmly in place. The platform should be made the proper size so that the stove legs may rest on the corners right over, or slightly to the inside of, the bolts. If this is not done there will be some trouble in putting the stove in place.

To use, have the loose corner open, and place the frame near the stove legs. Tip the stove forward so that the strip A may be put into place beneath the back legs. Then, lifting the front, draw the frame together and into position. The bolt in the top strip should drop into the hole in the lower one, and be fastened with a nut. Now the stove may be wheeled into the exact position desired, and by reversing the directions given above may be quickly unloaded. It is better to load the heavy end first and unload it last. Through the summer it will do no harm to let the stove stand on this truck. The casters should turn readily in any direction. Good ones can be purchased at five cents each.



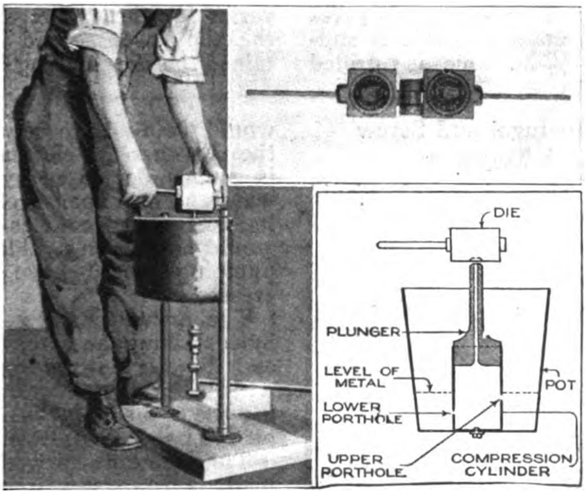
With a Collapsible Platform on Casters, a Heavy Stove may be Readily Moved by Only One Man, with Slight Assistance

A Homemade Die-Casting Machine

By C. M. MAHOOD

ONE of the interesting processes which have been introduced recently in quantity-production factories is that of making quite accurate finished castings without machining, by the process known as die-casting. In this process, the melted metal is forced into dies under pressure, and after it has cooled, the dies are opened and the finished castings removed. It is thus possible to cast parts which have the "particular" dimensions accurate to the thousandth of an inch, or even less. The metals used are alloys of fairly low melting points, as it has not been found practicable to make dies which would stand up under the temperatures necessary for casting iron or steel.

While die-casting is more particularly a factory process, yet, for certain jobs, it is entirely possible to use to advantage some methods of die-casting in the small shop. Whenever a considerable number of small parts have to be made which do not have to be of great strength, but should be accurate, the method of casting the parts directly to the finished shape should at least be carefully considered.



A Die-Casting Apparatus for the Home Shop: To the Left is Shown the Method of Making the Castings. The Smaller Photograph Shows a Type of Die for Casting Disks, and the Sketch Shows the Construction of the Apparatus

The apparatus herewith illustrated, which is almost entirely homemade, enables anyone to apply, in a somewhat crude way, the die-casting process. An ordinary iron kettle forms the pot in which the metal is melted, while two pieces of ¾-in. iron pipe, with two caps and two floor flanges, form the uprights which support it. These are set up and given a coat of stovepipe enamel. If the metal used is one having a fairly high melting point, so that the pot becomes excessively hot, a sheet-iron jacket may be placed around it, extending to the floor and inclosing the gas burner, gasoline torch, or other means of heating.

To the bottom of the pot is riveted a steel cylinder, which has an inner surface quite accurately machined. An old automobile cylinder, if not too badly worn, will serve, and the plunger may be made from the automobile piston, or machined from a very simple iron casting. The plunger is suspended by a wire loop tapped into it just beside the stem, and a cord runs from this loop to a lever, at the other end of which is a spring for the purpose of counterbalancing the plunger and automatically raising it, so as to clear the upper porthole. This hole, or slot, is about 1½ in. wide and ¼ in. high, and forms the main entrance for the metal from the surrounding pot. The level of the metal should be kept just above this porthole. A small porthole, about ⅛ in. in diameter, is also made near the bottom of the cylinder. Up through the stem of the plunger runs a ¼-in. hole, and the top of the stem is turned off to fit any standard countersink, which will be used in countersinking the sprue hole in the dies.

The dies are made in any of several ways. If one wishes to go to the expense of getting a high-quality die for long service, it can be ordered from a commercial die sinker. For certain types of parts, the die can be made by pouring out two pieces of cast iron and fitting them with dowels and wooden handles, and finishing the die inside with plaster of Paris. Such a die is readily made and is useful for short, rough runs.

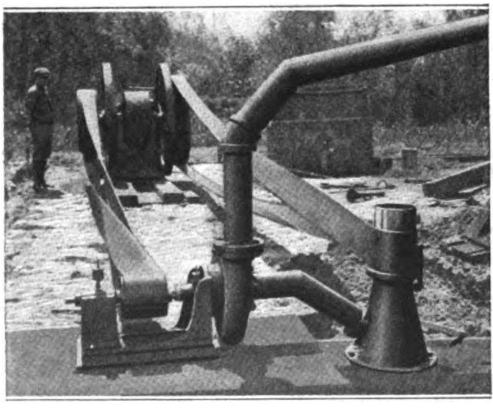
The operation of such an apparatus is as follows: Fill the pot with metal to a height slightly above the upper porthole, and heat the metal to 100° or 200° F. above its melting point, in order to offset cooling in the stem of the plunger. Heat the die with a blowpipe flame before making the first casting; after the run is started, the die will be sufficiently heated by the hot metal, and in the case of large parts may even have to be cooled somewhat between operations. Lubricate the die with beeswax; then close it, place it on top of the stem, with the end of the stem in the sprue hole, and press down upon the handles of the die. The metal will be forced into the die by pressure sufficient to form it for fairly accurate work. Remove the die at once, and as soon as the metal has had time to cool, open the die, throw out the part and proceed to make the next one in the same way. For small, thin parts, the time required for solidifying the castings will be found almost negligible, and the parts can be made as fast as the die can be closed, opened, and pressed down on the stem of the plunger.

As the plunger comes down, it at first forces metal out through the upper porthole; when the lower end of this is reached, the metal is forced upward through the stem. To prevent too great a shock when the main porthole is suddenly closed, the ⅛-in. hole is drilled farther down, which has the effect of diminishing the suddenness of closing the main porthole. The slight amount of metal which will flow out through this lower porthole will not prevent the flow to the die, as the action must be rapid.

Metals for this process are of various composition. Tables of alloys, having various properties, can be found in mechanical handbooks; the cheaper metals are those having a lead base, and have very little strength, though they are entirely practical for some purposes. The metal known as stereotyper's metal, composed of lead, tin, and antimony, melts at about 550° F., and is a useful metal for this class of castings. Where a harder product is desired, alloys with a zinc base and from 10 to 30 per cent each of copper and tin may be used. Shrinkage also varies for these different metals; that of the alloy used should be carefully ascertained before making any accurate die.

Pumps of Centrifugal and Screw Type Work Together

Tests of a well showed that it would furnish a large amount of water, but that a heavy lift would have to be overcome to get the water to the surface, when it would have to be lifted an additional 50 ft. into a large storage tank.



The Screw Pump Raises the Water to the Surface, and the Centrifugal Pump Then Takes Hold and Throws it Up to the Storage Tank

It was clear that for such a heavy head, a centrifugal pump would be best. On account of the limited suction capacity of such pumps, however, it was also evident that a deep and expensive pit would have had to be built.

On the other hand, one of the new type of screw pumps, made to fit the casing of the well and sunk below the suction limit, would plainly have been indicated but for the fact that the efficiency of such pumps is greatly decreased by a heavy head of water. The expense of the pit, with all its attendant troubles and annoyances, would have been avoided, but the cost of pumping would have been greatly increased.

The owner finally solved the difficulty by installing the screw pump in the well and directly connecting it at the surface with a horizontal centrifugal pump, placing the two side by side and running both off the two pulleys of his engine.

The outcome proved him right. The load on the screw pump is relieved, before the water reaches the surface, by the centrifugal pump, which lifts it from there on the additional 50 ft. into the tank, and the centrifugal pump does not have to exert its limit of suction to take in the water.—Henry Simon, Laguna Beach, California.

Staining Wood a Dark Color with Roofing Cement

When a dark-walnut flat finish is desired on woodwork, one may use the cement which is furnished with rolls of composition-roofing material. To use this cement for a stain, work it sparingly into the wood with a lintless cloth, or small varnish brush; if any surplus cement remains, take it off with the cloth. The results obtained with this novel staining material are declared to be very satisfactory.—H. K. Capps, Stahl, Mo.

COMMENT AND REVIEW

[These pages were printed December 20th.—Editor]

The Aeroplane Mail

A LOT of progress has admittedly been made in the world in other than post-office affairs, since the day when the old stage and its six-in-hand lumbered up to the tavern with its passengers and—important event—the mail. The mail is the one big lottery approved alike by church and state, and in a way, mildly satisfies that spirit of gambling which seems inert in even the most correct, for one never knows what may come next—a bequest or a bill.

The history of letter carrying has always been an interesting picture. It starts with the solitary messenger, on foot, braving the dangers of wild animals and wild men. Then the mounted courier, first a plodding horseman on an indifferent beast, and later a regular Paul Revere with frequent relays of fresh, fleet horses. Next the stage with its impressive function, whose arrival was really an event. From stage we diverge to steamboat and railroad train, and some look forward to a near future in which even these two shall converge in those swift vehicles of the air which are hoped to leave behind all previous carrying agencies as a mere speck on the horizon. Ever since that British airman carried a piano as ballast from somewhere in England to another somewhere in France, anything short of moving a house via the air route seems possible.

The service is so new and inexperienced, however, we should not be too impatient of immediate results, for obviously a general's important orders which must reach a distant point regardless of danger to life or loss of machine, if only minutes can be saved, is quite a different proposition from the great bulk of business and personal correspondence which can already be transmitted between points a thousand miles apart in as many minutes by telephone or telegraph as an aeroplane would require hours to accomplish.

Mere business documents will never warrant the peril to life and limb which is an accepted risk in warfare.

The few attempts with long-distance mail planes which have been made during the past 30 days suggest the need of considerable perfecting of air craft before a regular, dependable air service is possible. The attempted flight from the Pacific coast to Washington with only two scheduled stops got no farther than Arizona, while the attempt to start daily planes simultaneously from New York and Chicago was a complete fizzle: In each case the mail eventually was brought by railroad the second half of its journey, and consumed from twice to three times the time it would have made on a fast mail train. To accomplish even this, Carl Smith, a balloonist and aviator of 11 years' experience, was killed, and his machine wrecked. Other aviators were injured, and machines damaged.

In our impatience of results we are apt to lose sight of the fact that air travel will always be handicapped by storms and air conditions which do not seriously interfere with either a railroad train or a steamship, both of which have a substantial body on which to travel. An express train can reduce its speed and still proceed, a ship can reef its sails, or lessen its speed, and yet make headway; but an air vehicle cannot drop below a certain minimum speed and remain afloat. In the present stage of the art, the high-speed gas engine, the only present available power for planes, is not only a delicate machine, but very sensitive to atmospheric changes, and the present type of the strongest planes requires favorable conditions for rising and landing, and even for flying. Only a day or two ago a naval hydroplane rising in a fog collided with the top of a clubhouse. However, all these are incidents usual to development of a new idea, and already several successful flights have been made by compass—one of 407 miles—and long-distance flights would probably be made at high elevations to avoid clouds and treacherous earth currents.

Until a dependable night service is possible, there would seem little present advantage to business interests in an air mail service which requires nine daylight hours, for at present air mail between New York and Chicago must be posted either long before, or received after, business hours. Both the 18-hour trains, in service for years up to the war, and the present 20-hour trains, are far more serviceable, for a letter leaving New York at noon reaches Chicago at

9:15 a. m. the next day. Allowing one hour in which to deliver and two hours for reply, the answer leaves Chicago at 12:20 p. m. and reaches New York at 9:45 the following morning: a total of less than 46 hours, against 72 hours business time required by air service—unless letters are to be written and posted before six o'clock in the morning.

With the return of peace and the opportunity to develop the plane under conditions of deliberate experiment, the same spirit of inventive genius which evolved a heavier-than-air machine, can be counted on to perfect it. There will naturally be some days in every year in which no plane can navigate, just as there are now some days in which trains are stalled by snow or water, but a few unusual storms do not constitute the average weather, although there probably would be more such days for planes than railroads.

The perfection of planes in the next few years will be one of the most interesting features of a lifetime. In the meantime we must not demand nor expect too much.

There are those among the British aviators who predict that air travel will broaden and soften the minds of men as no other form of travel has, or can ever accomplish. Seen from the sky, the rapidly passing panorama below reveals great cities as mere spots, and vast railway systems as the faint lines of a spider's web. Large lakes become ponds, and one country blends into another in that harmonious whole which the Creator intended. Under these impressions the ego of the individual, and the petty selfishnesses of the human mind, fade into insignificance before the grandness of it all, while a vision of the millenium steals upon one's consciousness.

* * *

Sinking the Fleet

THE daily papers have made some quite readable copy of late out of the rumor that to avoid jealousies and heartburnings among the allies, it was urged that the surrendered German fleet be conducted to the location of some mile-deep hole in the ocean, and be inducted thereto as the safest means of avoiding disrupting disputes. It may be a very pretty piece of sentiment which would consign a huge navy at one swoop into honorable oblivion—it savors somewhat of the long-observed tradition, wherein honor demanded a perfectly capable and able-bodied captain to go down with his ship. Such a brave burial would be very pleasing—to the Huns, to whom the whole scheme may be fairly credited. If they had to lose their navy, naturally they would "despise" to see their victors adding it to their already large fleets.

The conduct of the German navy throughout the war has been one huge joke. Its stage entrance had been so brilliantly worked up, the world was prepared to witness something really formidable. In the first few weeks, owing to advance information of when the fatherland would be called on to defend itself against invasion, a few German cruisers and armed merchantmen did make some havoc among unarmed freighters. 'Twas a noble, brave conquest, inasmuch as the first intimation the helpless victim had that a war was on, was when it found itself all shot up and sinking. The English and French saw to it that this performance didn't last long. For two or three years the Bernstorff grapevine brought at intervals the news that the German grand fleet was getting up steam to come out and annihilate everybody. But the British were too many, and the one time a few German war craft stayed out late at night, the alert Britannia licked them so hard the escapade was never repeated. Still the rumors were kept up. It is doubtful if the British had any real hopes of a naval combat the last 18 months of the war.

Never was there such a complete naval surrender since Noah abandoned the world's entire merchant marine. Pompey lost a lot of galleys and Anthony his fleet, and the loss of the Spanish Armada was the sensation of the century, but never anything like the surrender of the German fleet. They were so peeved over the outcome the surrendered vessels were turned over in a shockingly dirty condition, than which no greater crime is possible in the eyes of Jack Tar.

And now they would like to see a grand sinking. Of course they would, and of course they won't. The allies can be trusted for a perfectly satisfactory division; in fact, the truth is, probably none of them would feel very bad if the entire fleet were to be turned over to the British as trustee for civilization, to maintain and administer in the cause of righteousness. The other allies would still have the benefit of its protection without the cost of its upkeep.

The sinking of the German fleet is a fairy tale like the Holy War, and the Revolt in India, and a few other things which are almost forgotten. The incident has its value, however, in reminding us the Hun is still running true to form as the same sly, intriguing old trouble maker as of yore.

Disarmament, partial, or by the slow process of depreciation without replacement, may not be seriously considered at the treaty making. It would be too much a case of dismissing the shepherd before the wolves were toothless. The allies, as comrades in arms, have found and proved how successfully, and agreeably, they can work together. If, henceforth, diplomacy by this combination of powers, can only be conducted in the open and with the joint knowledge and advice of each of the others, no other combination can stand against them.

In the interests of universal peace it may be safe to discontinue further increase in the navies of the allies, as long as no other nation builds new warships. In 15 years the navies of the world would thus become obsolete.

* * *

Waiting for the Treaty

TO the world at large the cessation of hostilities was almost as great a surprise as was the breaking out of the war. In official circles, the end was confidently counted on for several weeks before it was accomplished. So engaging of every effort of mind and hand was the prosecution of the war, there seemed little haste for thought of what the final settlement shall include.

No problem which has ever engaged a congress of nations compares with the responsibility and magnitude of the work before the Peace Commission. Like all great bodies it appears to move slowly, but in due time, like a huge ship, it will cast loose, get under way, and start on its voyage. What its destination will prove to be is of momentous importance to every human being on this earth, and to millions yet unborn. Its importance politically and socially is so far beyond anything in the past, that historically it may almost rank with those great upheavals of Nature in which our Earth was born.

That the men, upon whose shoulders rests the formation of a right and lasting settlement, realize their responsibility, may be accepted.

The countercurrents of wind and wave of suggestion which reach us, indicate the careful approach of the actual negotiations, and give hopeful promise of sane and safe decision.

The whole affair is so vast, and its interests and dependent interests so many and far-reaching, the undertaking is something like the ministrations of relief and reorganization which immediately follow a great flood or conflagration. However, as in those disasters, each day tends to bring order out of chaos, although at first progress may seem slow.

In this effort the best minds of the world are enlisted for its solution, and, it seems, with generous harmony of purpose. The effort of the Huns to throw monkey wrenches in the gears has thus far only bruised their own hands.

To those of us who demand the personal punishment in the persons of the chief offenders—which should include all of us—the sheriff seems a bit slow in arresting the criminals who have already been indicted in the court of world opinion.

In the meantime it behooves us to keep the faith, and, because the gas and liquid fires are no longer being hurled at ourselves and the allies, not forget the spirit of arrogance and hate which conceived them. Not one single repentant word has come out of Hundom. On the contrary, the spirit of defiance burns as brightly as ever. Ever and anon appear allusions to "the next war," while in an appeal to the allies, Eisner says:

> "We do not come to you in sackcloth and ashes, doing penance. We come as men, conscious of having cleared away the old system. We come with pure hearts. That is why we remind you that we are 70,000,000 human beings who want to live, and that it is your duty to forget and to help us reconstruct the new world."

We may be more forgetful as a nation than we should, but with our wounded and dying reaching our shores by the shipload, with thousands more to come for months, we resent being told it is our "duty to forget"—and it will be noticed we are not asked to "forgive."

What we need to guard ourselves against is the danger of relapsing into indifference to the crimes and horrors which the Huns inflicted on humanity.

Even now the Hun in our midst is rapidly resuming his attitude of arrogance and insult to our flag; cautiously, but none the less deliberately. Ships already are afloat headed this way with cargoes of German-made goods, stored for years in neutral (!) European countries, whose value runs into the millions of dollars in a single cargo. German agents already here are taking orders from merchants, who are either pro-German or whose lust for gain absorbs their honor. The moment the gates are open Hun salesmen will swarm over here, prepared to sell goods at a price at which no American workman could produce them and live. Merely for their own protection, the American workmen, of all citizens, should refuse to buy goods made in Germany.

Having time and again proved themselves intriguers; deceptive, barbarous, liars, defilers, why should we open our gates to such a people? Of course, there must be some there who are not so black, but it's dangerous to empty a bag of snakes in the room because a few are probably harmless. It would be a righteous expression of our abhorrence of Hunism not to admit for residence here, for the period of at least five years, any emigrant from what was Germany or Austria. It would be more convincing of our opinion of Kultur than the exacting of any possible indemnity in money—which they would proceed to make out of us and pay us with our own gold. Nor must we relax in our attitude toward those flagrant offenders—those already interned. They must be tried and, if guilty, convicted, and no foolish sentiment should plead for them "the war is over."

The war is NOT OVER in this country as long as one single voice is raised against our flag, our institutions, and our high ideals of right and wrong. These offenders cannot understand these ideals because the noise of Kultur has been dinned into their ears in the cradle, in the school, in the home, and in the church, until they simply cannot hear the clanging of the Liberty bells.

We should abolish in this country every school, private, public, or Sabbath, conducted in any language but English. When the Pilgrim Fathers landed they thanked God for freedom in the English tongue. When the minutemen fought for liberty, they spoke English. When that greatest of all human documents, the Declaration of Independence, was framed, it was written in English. The "Star-Spangled Banner" and the "Battle Hymn of the Republic" were written in English. The English language has been the language of freedom, and opportunity, and self-respect, and deliverance from oppression, throughout this broad land all these years. If this country is good enough for foreigners to leave their homes across the sea to make their home here, our language must be good enough for them to speak, and we should insist on it. I would make it a condition for an emigrant to land here, that every member of the family over eight years of age must be able to speak English "so you can understand it" unless he was dumb or tongue-tied. I would decree that after the year 1920 no announcement, pamphlet, or periodical, should be in any language but English.

Our boys in France, with utter devotion to their country, have carved for themselves such a high place in history, the very least we who remained safely here at home can do in their honor, is to humbly and unceasingly maintain their standard of loyalty and patriotism, and never let it fall from that exalted height to which they raised it.

The Light That Failed

ABOUT five years ago tons of medals were struck off to commemorate the expected entrance into Paris of a German "war lord." The plans for the grand induction were complete to the most minute detail, and called for a show of splendor and armed power second only to the pomp and glory of the days of the Caesars. The pink of the German army with glittering arms and helmets, thousands upon thousands of them, were to grace and guard the boulevards for miles. All the equipment and panoplies of war had each its appointed place in the procession of division after division, which were to march to Hunnish music while dejected Parisians wept in an agony of fear and disgrace. At the head of this vast multitude of conquerors was to ride the war lord himself, surrounded by hundreds of staff officers in magnificent uniforms, while from public buildings and housetops floated defiantly

the flag of two eagles, and the bells of Notre Dame led the wild clamor of spire on spire.

And after the ceremony of occupation . . . . .

All this was planned with the most careful detail and confident assurance.

The grand entrance to the city of Paris was made a few days ago. Soldiers by thousands lined the boulevards, as planned, but they were French and allied soldiers.

Flags waved from every public building and housetop, as planned, but they were chiefly the flags of France nestling close to a simple flag composed of stars and stripes.

The head of a Great Nation was being conducted with simple honor to receive the Freedom of the City. He wore no uniform; he was dressed in the somber garments of the civilian. He did not ride a bespangled steed, he had no dazzling retinue of staff officers. He rode in a modest open carriage, drawn by a single team of horses.

All Paris and some of France was there. The people lifted up their voice, but it was the spontaneous voice of gratitude; tears fell from many eyes, but they were tears of gladness; and the bells of Notre Dame rang out, and the other bells, but they were eloquent with joy.

The children threw missiles at the stranger, but they were garlands and bouquets of fragrant flowers.

"Der Tag" had at last come, but NOT as planned.

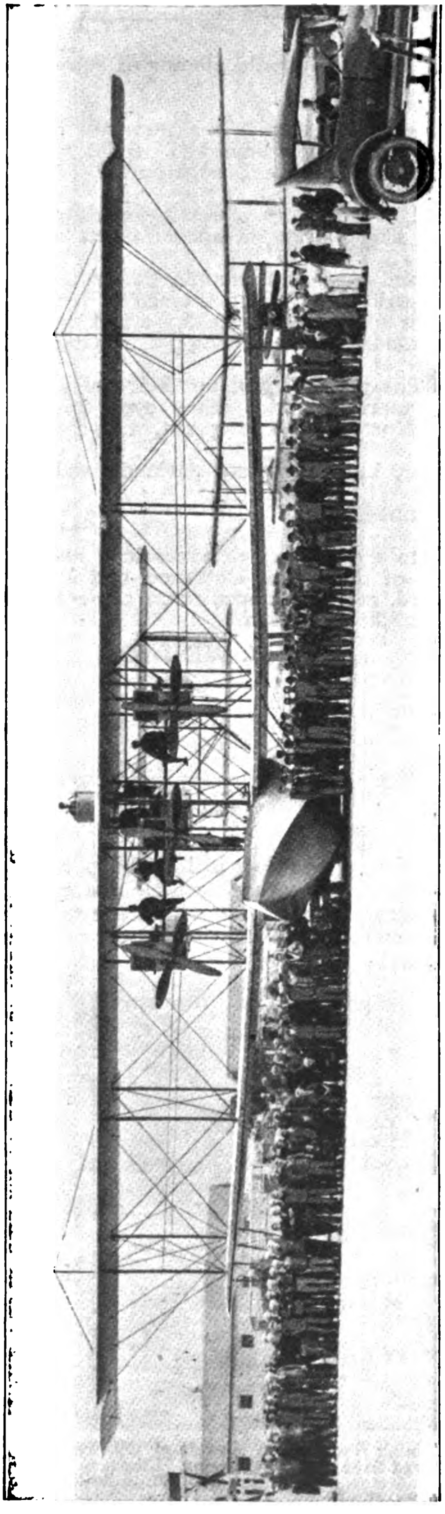
And at that moment, in far-away Holland, to a voluntary prisoner in a reluctant sanctuary, the wires brought the tidings of the Grand Entrance, and as he who was once the haughty, heartless war lord, read the news, there came a far-away look into his eyes as he murmured, "It might have been."

H. H. WINDSOR

MINERS BY STRANGE CHANCE FIND RICH OIL FIELD

Two prospectors, operating a placer mine in California, were dismayed one day not long ago to find the spring dried up from which they obtained water. However, holes drilled near by started the water flowing again, and to increase the flow they bored into the hillside 20 ft. This gave them enough water to resume operations. On returning to work the next morning, what was their astonishment to find a 2-in. stream of crude oil flowing from the bore. A dam was hastily built to conserve the oil until pipes could be laid to a near-by town. Later, bores were driven 60 and 150 ft. into the hill, and now the flow is 100 bbl. per day. The oil is light, with very little water. In the temporary reservoir which the miners constructed, about 2,000 bbl. of oil accumulated.

Temporary Reservoir Containing About 2,000 Barrels of Oil, Which Is Only Part of What had Flowed from the Neighboring Hillside Since the Day When Two Prospectors Accidentally Struck Oil While Drilling for Water to Resume Their Mining Operations



Bow View of the "NC-1," the Greatest Seaplane That has Ever Taken to the Air: The Craft Mounts Three Liberty Motors That Drive as Many Four-Blade Propellers. One of the Unusual Features of the Ship Is Its Modified Conning Tower, Located in the Middle of the Top Plane, which Serves as a Lookout Post for an Observation Officer

AMERICAN BOMBING SEAPLANE CARRIES FIFTY PERSONS

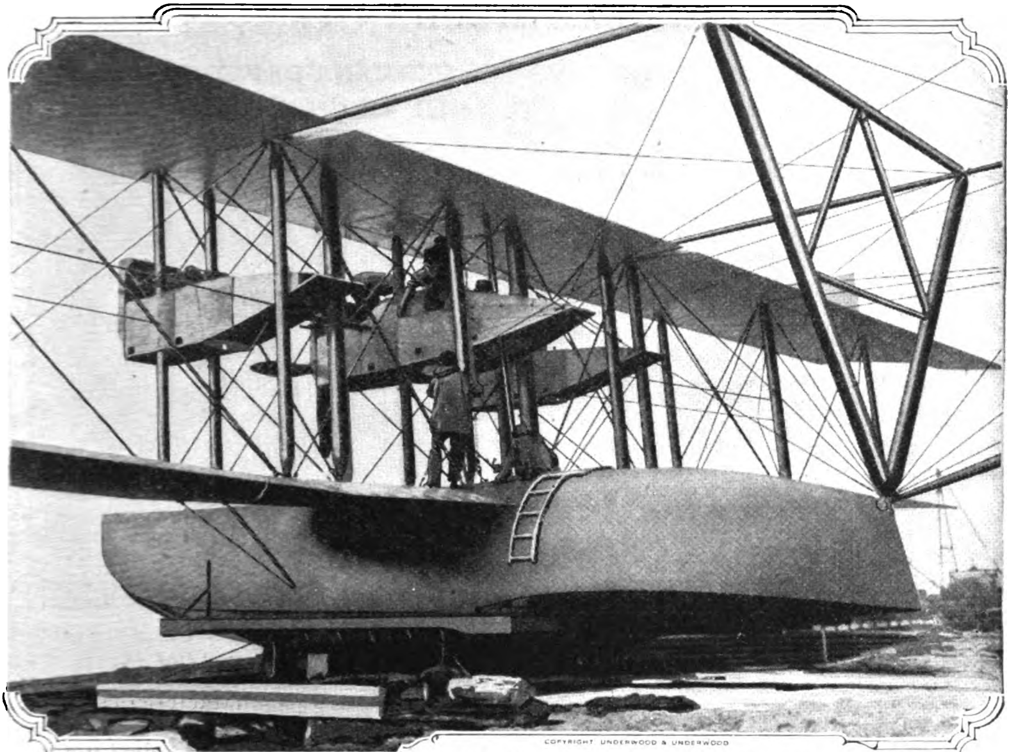
All existing passenger-carrying records for heavier-than-air flying craft were shattered late in November when the navy's new giant seaplane "NC-1" went aloft at Rockaway, N. Y., with 50 persons aboard. This remarkable performance served to center international attention on the latest type of all-American plane, a machine, incidentally, that is the largest of its kind in the world and apparently preëminent in its field for the time being.

The "NC-1" was constructed from plans prepared by the Aircraft Division, Bureau of Construction and Repair. In many respects it is original in design, although it embodies standard ideas. In an official statement authorized by Secretary Daniels, it is asserted that while the craft is not specifically a flying boat, neither is it a seaplane of the pontoon variety. On the other hand, it is described as embodying the most valuable advantages of both types. Contrary to this, however, the vessel bears all of the characteristics of the flying boat, if its appearance, as shown by photographs, may safely be relied upon.

With a spread of 126 ft., of 12-ft. chord, and a boat body as large as a fair-sized launch, the new craft makes a most imposing appearance. It is a biplane with a 12-ft. gap, and mounts three 12-cylinder Liberty motors that drive separate four-blade propellers and generate a total of 1,200 hp. When unloaded and without its crew, it weighs 13,000 lb. Its flying weight is placed at 22,000 lb. Its fuel capacity is 300 gal. In official flights a speed of about 80 miles an hour has been developed.

The pilot's seat is understood to be situated between the two planes in the central "power egg." On top of the upper plane is a modified conning tower in which an observer is stationed. From this position he has a commanding view in all directions. Seats are provided beneath the bottom plane for four other observation officers. Other members of the crew are accommodated in the boat body. The machine is termed a bomb-carrying seaplane and is being used for coast patrol. Others of the same type are understood to be in the course of construction.

It is intimated that the preëminence of this remarkable ship may be of only short life, since Caproni is reported to be building two great planes designed to be capable of carrying 75 and 100 persons, respectively.



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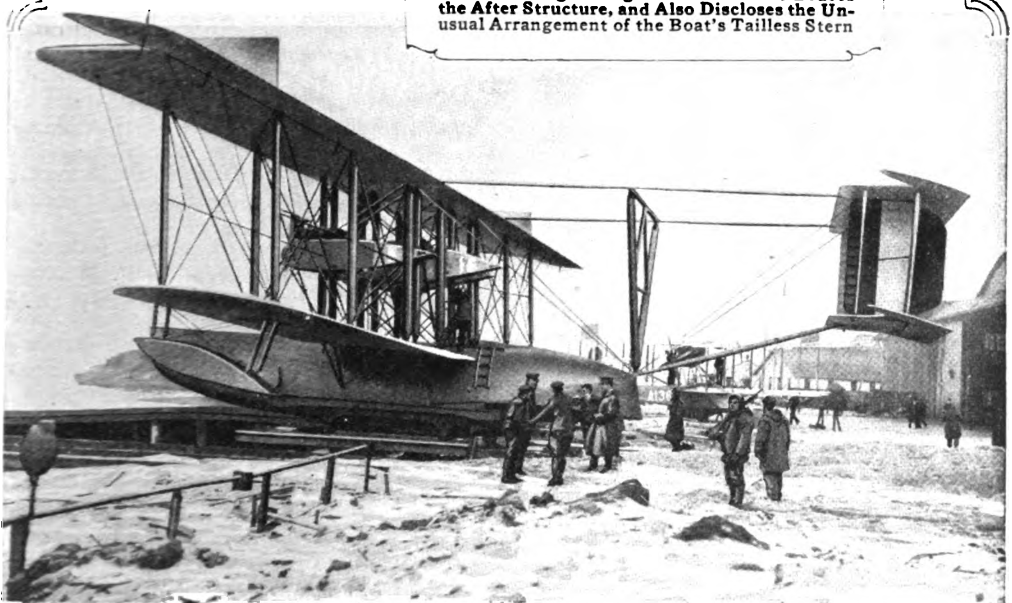
An Excellent Side and Stern View of America's Great New Seaplane is Presented Above. The Picture Well Illustrates the Placement of the Struts That Support the Three Motor Nacelles, Shows the Big Triangular Frame That Braces the After Structure, and Also Discloses the Unusual Arrangement of the Boat's Tailless Stern



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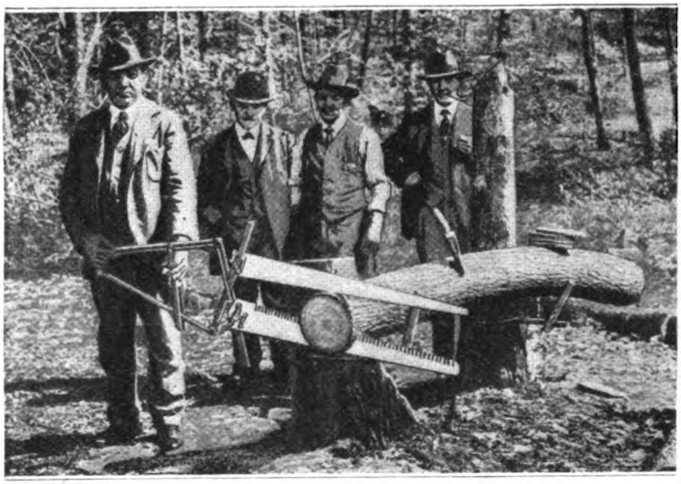
Another Side View of the Big Seaplane Which in a Recent Flight, at Rockaway, New York, Attracted International Attention by Carrying 50 Persons Aloft: It Is This Remarkable Machine That Glenn Curtiss has Proclaimed as Undoubtedly Capable of Successfully Flying across the Atlantic Ocean

ONE MAN DOES WORK OF TWO WITH NEW SPRING SAW

With the aid of a new saw that has lately been introduced, it is claimed that a strong boy or woman is able to cut more wood than two experienced lumbermen equipped with a standard crosscut saw. In support of his claim is the record made during a contest conducted a short time ago.



Showing the Spring Saw, Which Enables One Person to Do as Much Work as Two Ordinarily Accomplish with a Standard Crosscut Blade, in Use. The Top Blade, It will be Observed, Is Toothless

Two men with a crosscut saw mastered an 11-in. chestnut log in 92 strokes, while one man, with the new machine saw, accomplished the same work in 70 strokes. The implement consists of two steel arms actuated by a powerful connecting spring. A bracket is attached at the fore end of each of the members, and to these the blades are clamped. To operate, the saw is merely drawn back and forth in the usual manner, all of the necessary pressure being exerted by the spring. The entire contrivance weighs only 12 lb. It is especially suited for the farmer who does not wish to incur the expense of purchasing a power outfit for cutting fuel wood. In addition to cutting logs, it may be employed for felling trees of medium size.

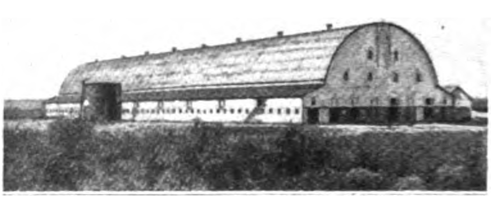
Among the novel uses of raw products to which the war has given rise in Europe, is the making of a useful paste from garlic, the preparation of certain fungi to serve as a substitute for cork, and the production from heather of briquettes of high heat value.

GERMANS DEPRIVED LILLE OF MUCH-NEEDED SERUM

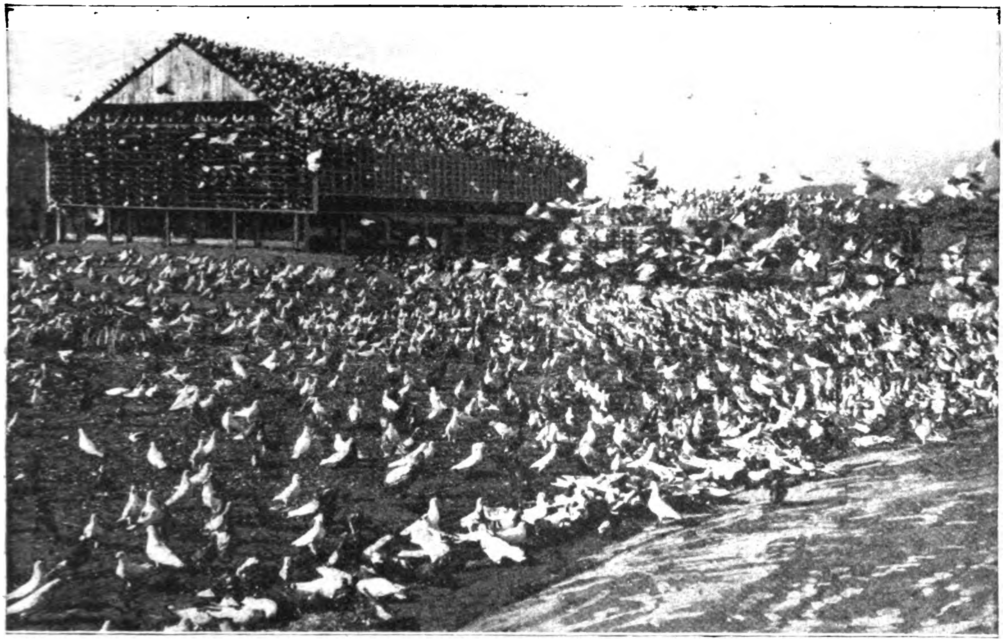
Another German atrocity bespeaking the same incomprehensible inhumanity that characterized so many Teutonic acts, has been made public by the head of the Pasteur Institute at Lille, who remained fearlessly at his post during the period of German occupation. He reports that despite his appeals and protests, the Germans took away the last three horses at the institute, which were used in the production of antidiphtheric serum. The fiendishness of the Germans' act is emphasized by the fact that the animals had been declared unfit for any service. The loss of the horses deprived the civil population of sorely needed serum at a time of year when the disease is of common occurrence among children. The Germans' act was a direct violation of international law as laid down at The Hague.

CANADIAN ROUND-ROOF BARN ONE OF WORLD'S LARGEST

One of the largest barns in the world. located at Leader, Sask., is conspicuous for its shape as well as its size, the roof being rounded and forming a great barrel-vaulted loft in which to store produce. The structure is 400 ft. long, 128 ft. wide, and 62 ft. high. The material used in its construction included 875,000 board feet of lumber, 30,000 sacks of cement, 60.434 sq. ft. of corrugated-iron roofing, and three tons of nails and other hardware.



Barn at Leader, Saskatchewan, Which is Said to Be the Second Largest in the World: It Is 400 Feet Long, 128 Feet Wide, and 62 Feet High



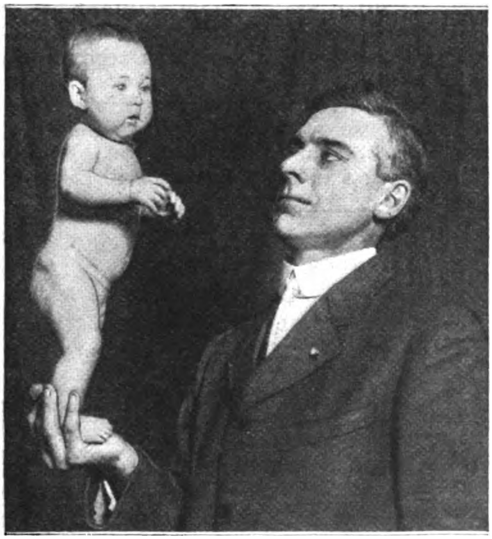
A California Pigeon Ranch, the Home of 100,000 Mature Birds, Which was Wiped Out in a Night by a Flood from a Near-By Mountain Stream: The Feeding Ground Is Now Part of the Bed of a Stream

HOME OF HUNDRED THOUSAND PIGEONS WIPED OUT

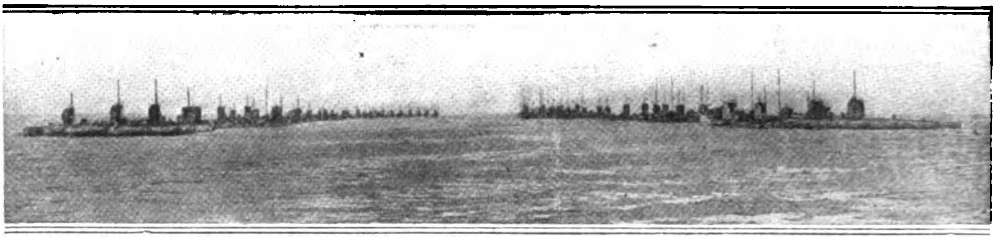
Formerly California boasted that it had the largest pigeon ranch in the world, no less than 100,000 birds having been taken care of on a tract not far from Los Angeles. But by a peculiar accident, which perhaps has no parallel, the entire establishment was wiped out, the very ground it occupied disappearing from sight. The cause of this misfortune was a sudden flood in a near-by mountain stream which swept all the buildings away, drowned many of the birds, and cut a new channel across what was the feeding ground. The pigeons which survived hovered around the spot for a few weeks or months, but finally scattered in all directions.

FOUR-MONTHS-OLD BABY STANDS ALONE

A Chicago family boasts of a baby which, at four months of age, was a graduate. That is to say, at that age it had progressed sufficiently in a special course of physical training to be able to stand alone and therefore was considered fitted to take up more advanced work. The training of the little youngster, enabling it to stand at four months while most babies cannot do this before they are nine months old, was begun in its third week. One of the first lessons consisted in teaching it to sit up by putting a hand at its back and bracing the tiny feet. At four months it was 23½ in. tall and weighed 11¼ pounds.



Photograph of a Chicago Baby Girl Standing Alone When Four Months Old: Most Babies cannot Do This Before They Are Nine Months Old. An Interesting Course of Physical Training Is Responsible for the Remarkable Feat



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The Striking Photograph Reproduced Above Shows Some of the German U-Boats That Surrendered at the Rendezvous off Harwich. They Are Now in the Hands of Responsible Nations and No Longer a Menace to Humanity

SURRENDER OF GERMAN FLEET GREATEST NAVAL EVENT IN HISTORY

FOUR salient points stand out in the surrender of the flower of the German navy to the allied armada in the North Sea, off Firth of Forth, November 21, last.

Naval tradition holds no parallel of a great sea force ingloriously handing itself over to an enemy without so much as firing a shot. Even the Spaniards, with full knowledge that defeat awaited them, had the spunk to make Sampson win his honors at Santiago.

The German surrender was marked by the most titanic assemblage of fighting vessels ever congregated for any purpose whatever.

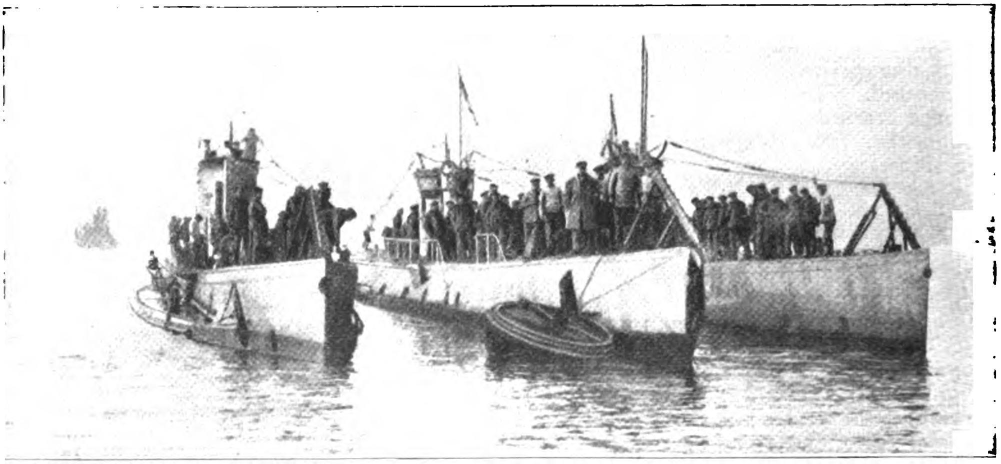
By meekly turning over her warships, Germany reduced herself to a sixth-rate naval power.

The United States Navy, without being put to any inconvenience whatever, automatically became the world's second sea power.

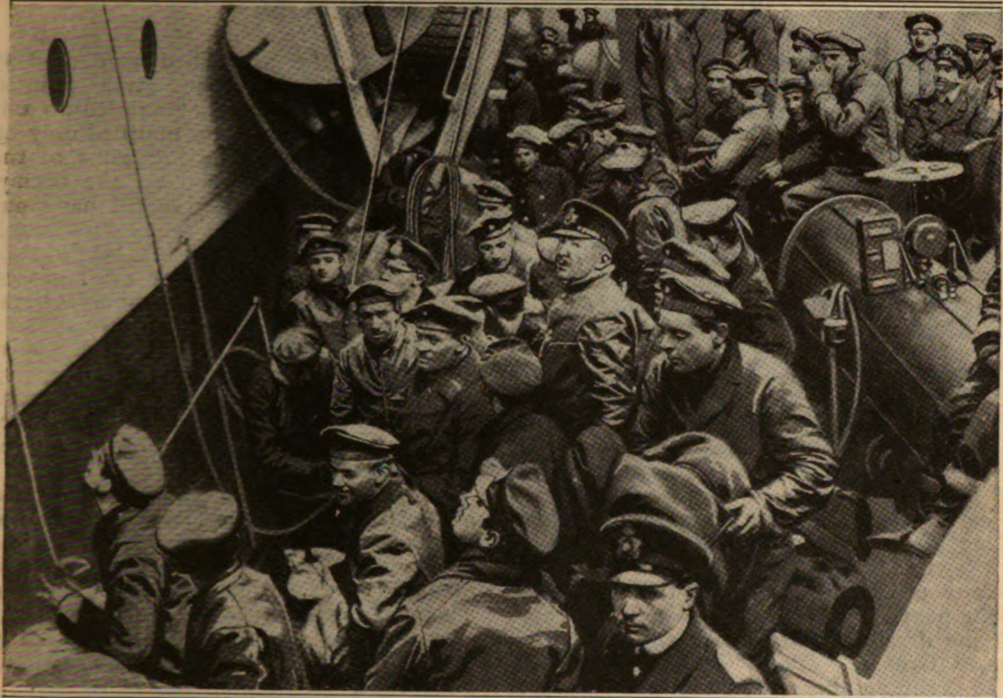
Actual surrender of her fighting ships, in compliance with the terms of the armistice, was begun by Germany on November 20, when at dawn a fleet of 20 U-boats was turned over to five British light cruisers at a rendezvous 35 miles off Harwich in the North Sea. On the morrow the Hun witnessed "Der Tag," for then it was that the first and major installment of the German High Seas Fleet surrendered to Admiral Sir David Beatty, commander of the Grand Fleet. On that same memorable day, the second group of submarines was surrendered off Harwich. From then on, delivery of U-boats continued for some days until the terms of the armistice, which called for six battle cruisers, 10 battleships, eight light cruisers, 50 destroyers, and 150 submarines, were complied with.

How the German navy ignobly struck its flag, once and for all admitting supreme cowardliness to the inexpressible disgust of every red-blooded jack afloat, is known to the whole world. As a matter of record it is briefly sketched herewith.

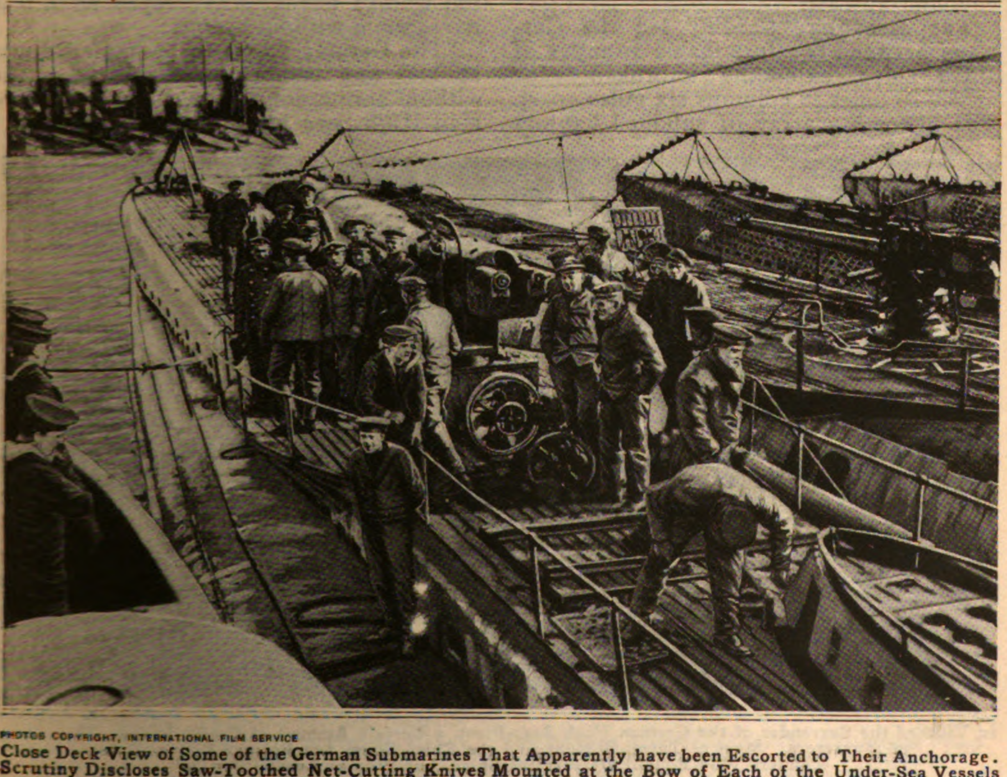
The conquering allied armada, to which the surrender was made, was composed of about 400 vessels. America was represented by the "New York," flying the flag of Admiral Rodman, with Admiral Sims



At the Rendezvous: Close View of Three of the Hun Submarines after the Surrender. The Crews are Lined on Deck, and an Escort is being Awaited to Convoy the Cowed Murderers to Harwich



Above Is an Interesting Study in Facial Expression: It Shows Sailors from Surrendered German Submarines About to Board a Hospital Ship That Accompanied Them to Harwich and will Return Them to Germany



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Close Deck View of Some of the German Submarines That Apparently have been Escorted to Their Anchorage. Scrutiny Discloses Saw-Toothed Net-Cutting Knives Mounted at the Bow of Each of the Under-Sea Vessels and his staff aboard, and the "Florida," "Wyoming," and "Arkansas." The French navy was represented by the armored cruiser "Admiral Aube," flying the flag of Rear Admiral Grasset, and two destroyers.

Early in the morning of the appointed day, the Grand Fleet began to weigh anchor at its moorings in the Firth of Forth and form the double line that it maintained throughout the day. Battle cruisers, followed by dreadnaughts, led the way toward the rendezvous some 50 miles distant. The squadron in the northern column was led by the "Queen Elizabeth," Admiral Beatty's flagship, abaft of which the United States vessels took up their positions.

Shortly after dawn the "Cardiff," trailing a kite balloon, was sighted. Following doggedly behind it came the cruiser "Seydlitz," the first of the Hun ships, and four others of the same type in single file nearly a half a mile apart. Then came nine dreadnaughts, led by the "Friedrick der Grosse." The "Grosser Kurgurst" brought up the rear, and three miles aft of it steamed seven light cruisers. The tail of the shameless procession was brought up by 50 destroyers sailing five columns abreast.

The escorting "Cardiff" led the Germans between the formidable gauntlet of allied ships, extending unbrokenly for nearly 20 miles in columns six miles apart. The oncoming array of subdued fighters steamed at the prescribed rate of 11½ miles an hour. Their guns pointed straight fore and aft, they carried no ammunition and they were manned only by navigating crews. The big guns of the allied ships were trained on the enemy, ready to blow her disgraceful navy out of the water if it made a miss move. Every man jack was at his battle position ready for action. Air craft circled overhead, and scores of binoculars scrutinized every inch of each German ship as it came into sight. Men at finders continually corrected the range of the enemy advance. But the Hun was through with his "overt acts," and nothing occurred to mar the complete ignominy of his "place in the sun."

The allied ships put about and formed in squadrons when the far-western end of the flanking lines had been reached by the headmost of the surrendering men-of-war. Steaming westward, the Grand Fleet then began to accompany the Hun to his place of internment, the Firth of Forth. Early in the afternoon the enemy was shown his anchorage.

When the mooring was completed, Admiral Beatty issued the following laconic order, the like of which never before in the world's history was obeyed by a real naval force without a fight:

"The German flag is to be hauled down at 3:57 and is not to be hoisted again without permission." Thus passed the German High Seas Fleet to its ignoble end.

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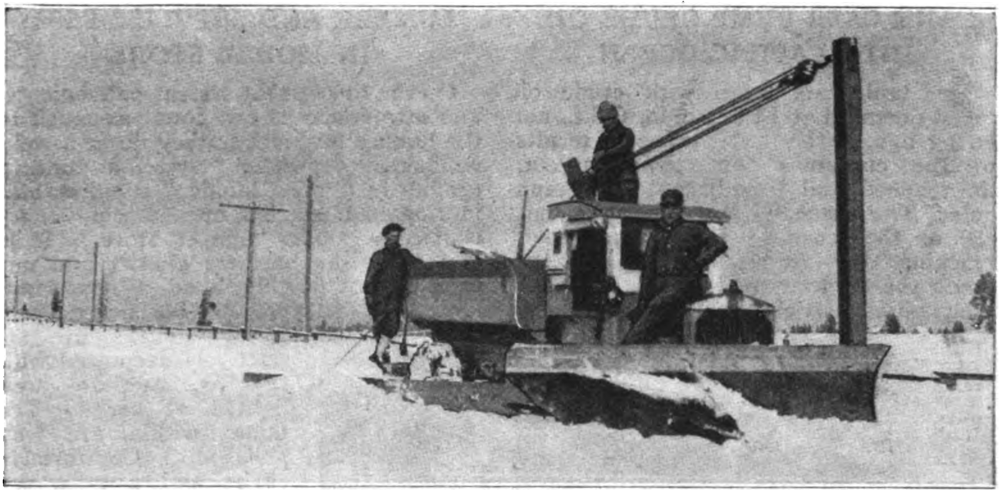
In View of the Surrender of the German High Seas Fleet, a Certain Amount of Credit Is Due This Gang of Murderers. Most of Them, Surrounding the Chief Thug, Are Former U-Boat Commanders Who Fought Defenseless Ships, but Who at Least "Fought"



The Truck, in Front of Which the Snowplow is Mounted, is Equipped with Runners in Place of the Front Wheels. The Clearance of the Plow is Regulated by Means of the Block and Tackle Attached to the Tall Beam at the Front of the Plow

MOTOR-DRIVEN SNOWPLOW CLEARS MONTANA ROADS

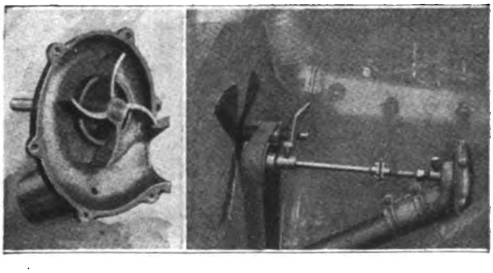
A Montana county engineer has built a snowplow, designed to be driven by a motor truck, with which he believes it is possible to keep the highways open in spite of the heaviest snowfall. The plow is V-shaped and is mounted in front of the truck, which is provided with runners in place of its front wheels. The proper amount of clearance is obtained by means of block and tackle connecting a heavy upright mounted at the apex of the plow, with braces placed back of the driver's seat. Being attached to the truck the plow cannot easily shift sideways.

TRAINING THOUSANDS TO MAN BIG MERCHANT FLEET

Because the United States Shipping Board expects to bring the total number of vessels in its merchant fleet up to nearly 2,000 by the end of 1919, it is most important that a sufficient number of men—approximately 220,000—be available to run these vessels. The permanent facilities for giving instruction along the necessary lines will now accommodate 110,000 men. The institutions are: the Great Lakes station with a capacity for 45,000, Newport and Hampton Roads, 25,000 each, and Pelham Bay, N. Y., 15,000. The first principles of seamanship are also taught on some hundreds of ships which serve as floating schools. A number of institutions are giving courses for training naval officers.

ROTARY PUMP FOR COOLING SYSTEM OF LIGHT CAR

Another accessory for a certain light motor car in universal use, consists of an eccentric centrifugal pump for the cooling system. The device is of current introduction and is especially suited for installation when the car has been converted to a truck or tractor, and is therefore particularly in need of some auxiliary appliance to prevent the motor from overheating. The new pump, which may be attached in 20 minutes without drilling a hole, is complete with stuffing box, grease cups, and fittings. It is driven by the fan belt through a slender shaft with universal joint that compensates for any misalinement that may occur. As an index to its apparent merit, it circulates water at the rate of five gallons a minute, which is rapid enough to prevent freezing, it is claimed, in the coldest weather. The outfit is neatly arranged and takes up but little space beneath the hood.



The Interior Arrangement of the Centrifugal Pump is Clearly Shown at the Left. The Other Illustration Pictures Its Installation

TANK CARS DUMP CRUDE OIL INTO PACIFIC OCEAN

Ten tank cars laden with crude oil rolled downhill at El Segundo, Calif., not long ago, with disastrous results to the containers, their content, the roadbed, and adjacent telegraph poles. The scene of the accident was on the ocean front, and upon reaching the bottom of the grade the runaway cars buried their noses ostrich like in the sand. Oil covered the water for a distance of several miles out from the shore line.

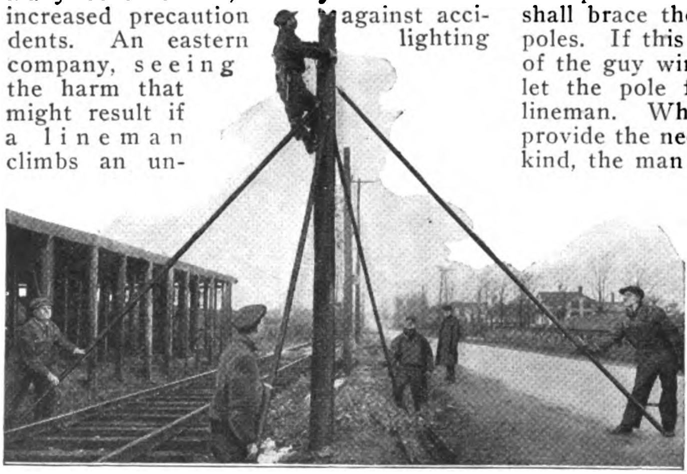
Some of The Ten Runaway Tank Cars Half Buried in the Sand at the Bottom of a Steep Grade at El Segundo, California

LUMBER AND SUPPLIES SOLD IN MODEL STORE

On the theory that system, convenience, and attractiveness can count as much in the lumber business as they do in a well-conducted department store, a concern dealing in lumber, builders' supplies, etc., in Logan, Utah, has opened what is acclaimed a model "lumber store." It is located in the business district and not in a remote neighborhood, as are many lumber yards. The large plate-glass windows are attractively decorated with supplies, and are well lighted at night. The floors within are well polished. Comfortable chairs and a table are provided for those who wish to inspect a large collection of house plans. Samples of all kinds of hardware stock are displayed in geometric designs in wall cabinets, and the paints are so arranged that one can see at a glance the available shades. A special fixture is provided for inspecting 18 styles of front doors. Much of the lumber at the rear is under cover, and neatly arranged. The management of the store seeks to emphasize the fact that they are not merely lumber dealers but home builders.

ROTTED POLES BRACED TO SAFEGUARD CLIMBERS

In the work of electric linemen, as in many other trades, each year witnesses increased precaution against accidents. An eastern lighting company, seeing the harm that might result if a lineman climbs an unbraced pole which is rotted at its base, now provides that in such cases four men shall brace the rotted member with pike poles. If this is not done, the detaching of the guy wires, or the conductors, may let the pole fall, seriously injuring the lineman. Whenever it is impossible to provide the necessary men in cases of this kind, the man doing the climbing is cautioned not to use his safety belt, so that he can leap free of the pole in case it falls.



Bracing a Pole, Rotted at the Base, So that It can be Climbed with Safety. An Instance of the Increased Care being Taken by Electric Linemen to Prevent Accidents

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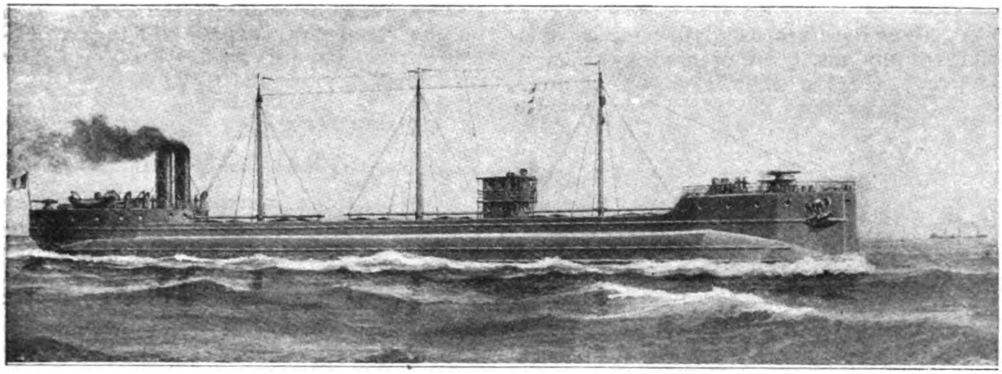
¶The level of Lake Nyasa, in southeastern Africa, after falling for several years has now begun to rise. Reports show that in 1917 it was more than 3 ft. higher than two years before.

STRANGE NEW STEEL VESSELS ARE NONSINKABLE



Afloat, the New Nonsinkable Ship Bears Close Similarity in External Appearance to the Whaleback Steamer, Which Is Well Known to Those Familiar with Shipping on the Great Lakes

Within a few weeks, it is expected, the first of a series of five supposedly unsinkable steel cargo steamers of an altogether new type, under construction at New Orleans for the French government, will be launched. According to the present schedule, the initial vessel will be completely equipped and ready for service the latter part of April.

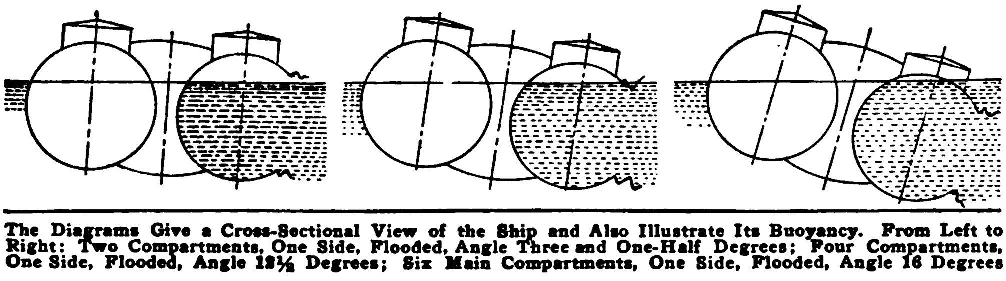
Although the submarine menace fortunately has been overcome, the necessity for a nonsinkable ocean-going ship still obtains. It is therefore interesting to observe some of the details in the design of the new type of steamer in question, which represents a radical departure from standard practice.

The boat is the invention of the naval architect who heads the technical service of the French merchant marine. In external appearance the carrier resembles a whaleback steamer. The likeness is only skin-deep, however, for the cross section of the ship, instead of being of the usual U-shape, is in the form of two circles placed side by side and connected above and below by curved segments.

Two parallel cylinders, 20 ft. in diameter, laid horizontally side by side, and connected by transverse water-tight bottom and deck plates, compose the unusual hull. The latter is stiffened and given protection from flooding by a series of seven water-tight bulkheads, each of which extends continuously from one side of the vessel to the other. Thus a system of 24 separate water-tight compartments is formed, eight in each of the cylinders, and a like number in the "reserve-buoyancy" space between them.

The new ship has an over-all length of 328 ft., is approximately 46 ft. of beam, and has a draft of 16 ft. Its dead-weight carrying capacity is 4,250 tons. The propelling machinery consists of twin triple-expansion, 700-hp. engines, designed to drive the vessel about nine and a quarter miles an hour when it is fully loaded. Scotch marine boilers fired with fuel oil will be used. Particularly interesting is the fact that one complete power plant is to be installed in each half of the divided hull. This arrangement will enable the ship to make port under its own steam, it is believed, even though one side has been completely flooded.

¶Dry pine needles have been used successfully in making brooms and brushes, tests having shown that because of their hardness they wear very well.



The Diagrams Give a Cross-Sectional View of the Ship and Also Illustrate Its Buoyancy. From Left to Right: Two Compartments, One Side, Flooded, Angle Three and One-Half Degrees; Four Compartments, One Side, Flooded, Angle 12½ Degrees; Six Main Compartments, One Side, Flooded, Angle 16 Degrees

NEW ZEALANDER'S QUAINT MILL SAWS DRIFTWOOD

A salvage station as distinctive as it is picturesque has been erected by a man 71 years old, on the beach about four miles from Gisborne, New Zealand. It consists of a crude windmill of the Dutch type, which furnishes power for a saw used by the old man in cutting up driftwood. The little mill is covered with squares of tin which once were old oilcans, while the wooden portions were obtained from a wrecked boat. The gearing, assembled from old machinery, drives the saw at 300 revolutions per minute.

Odd Windmill, near Gisborne, New Zealand, Made from Waste Materials: It Drives a Saw with Which the Aged Owner Cuts Up Driftwood Gathered on the Shore

MOTOR CAR "BOMBARDS" BRIDGE, COMPLETELY WRECKING IT

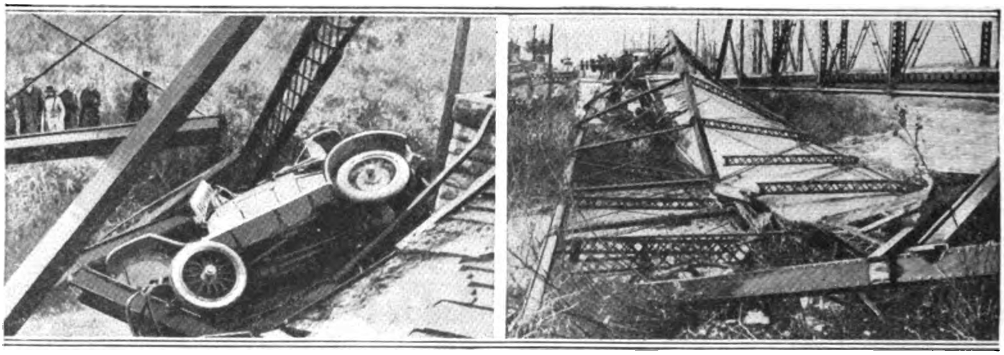
While speeding along the Dixie Highway, near West Alexandria, Ohio, a few weeks ago, a motorist accidentally drove his car with great force against one corner of a steel bridge, snapping one of the girders. Instantly the whole structure, which was 112 ft. long, collapsed as if it had been struck by a well-aimed shell from a big gun. Though the auto landed on the steep river bank amid the wreckage, the occupant suffered only a few scratches.

LIVE WIRE CAUSES DEATH IN STRANGE MANNER

Shortly after a rainstorm not long since a 13,200-volt transmission line in Wisconsin broke and fell on a wire fence. Three barefoot boys, walking along the road near by, felt an electric shock in their feet and two of them ran to a fence which was 60 feet from the one in contact with the transmission line and had no connection with it. One of the lads endeavored to crawl through the fence and was killed instantly, while the other, on starting to crawl beneath the lowest wire, was badly burned. The accident occurred three miles from the power plant, the boys being between it and the broken wire.

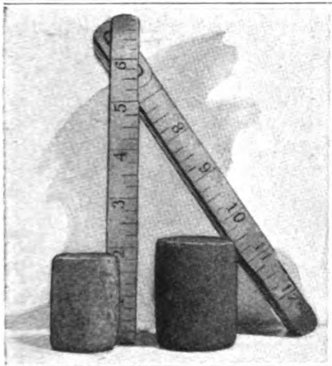
PLAN AERIAL-MAIL SERVICE FOR BRAZIL

Steps have been taken to institute an aerial-mail service between the various state capitals of Brazil, a concession having recently been granted to a private concern to undertake the work. Two years is the time allowed to get the service in operation, though the government may extend the period two years longer, if deemed advisable. At the outset, only the delivery of mail and small parcels will be attempted, but later passengers may be carried, and the number of cities served may be increased. The persons holding the concession agree to permit the government's student airmen to use their hangars and machines.

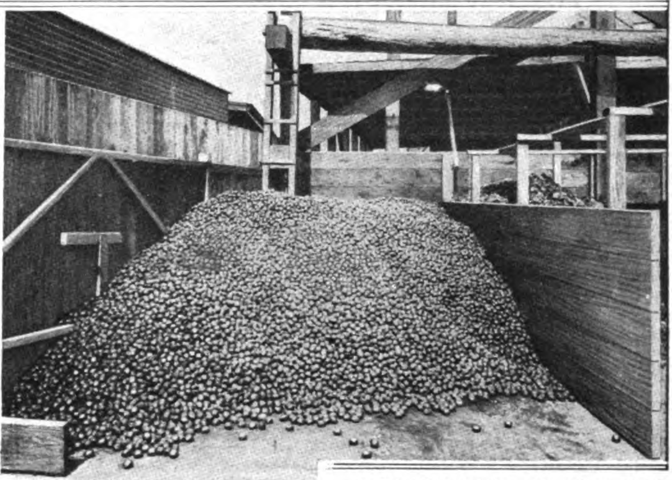


The Overturned Automobile at the Left Lies amid the Wreckage of a Bridge, near West Alexandria, Ohio, Which Completely Collapsed When the Car Struck One Corner of the Structure. The Extent of the Damage is Clearly Shown in the Right-Hand View

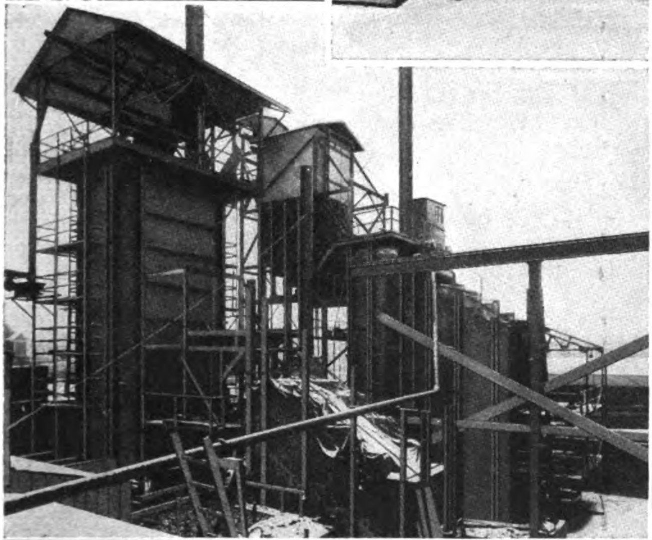
BIG CHANGES MAY RESULT FROM NEW-MADE FUEL

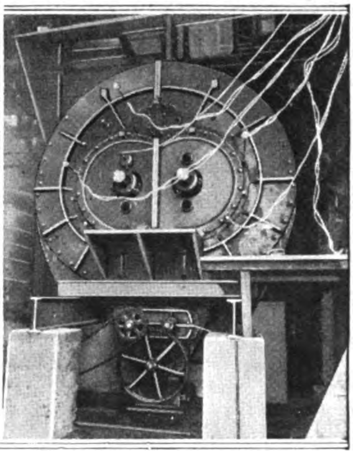


Two Briquettes of the New Fuel, One before and One after Distillation, Showing the Saving in Bulk That Results



A Bin Containing the New Fuel Which the Makers Believe will be Used in Preference to Hard Coal in Many Regions Far from the Latter but Near to Soft-Coal Fields





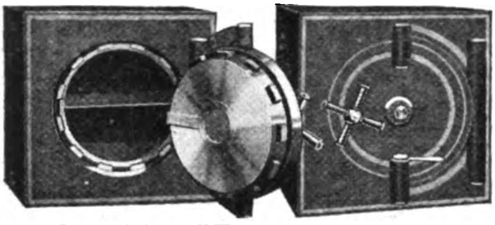
Part of the Demonstration Plant at Which the Production of the New Smokeless Fuel has been Undertaken on a Large Scale is Shown at the Left. In the New Process a Very Large Part of the By-Products is Conserved, Materially Reducing the Cost of the Made Coal. The Discharge End of One of the Furnaces Appears at the Right

Little short of a complete revolution in the coal business and, consequently, far-reaching changes in American industry, are the results which, it is predicted, will follow from the invention of a new commercial process of converting bituminous coal into an equivalent of hard coal. The new fuel is entirely smokeless, and under the new process by-products now wasted, are recovered. These largely compensate for the cost of conversion. A plant has been in operation in the East for some time. perfecting the process and making tests of a practical character.

The raw coal is subjected to a distillation process at low temperatures, the residue being pressed into hard, durable bricks that are again subjected to distillation and produce an intense heat. If the claims of the large interests already identified with the process prove true, it means that future problems arising from hard-coal shortage have been solved, that in many cases, power can be produced near the coal fields and transported at low cost to large industrial centers, and that cities remote from anthracite regions can procure a smokeless fuel for domestic and other uses, which can be sold at a moderate price. It is interesting to note that the government is preparing to establish a plant for producing this fuel in an eastern coal region.

NEW BURGLAR-PROOF CHEST BAFFLES CRACKSMEN

A product of the safe builder's ceaseless efforts to baffle the most skilled burglar is a chest, designed to be anchored within a larger fireproof safe, which it is claimed is really burglar-proof. To substantiate this assertion, one of these chests is mentioned, on which cracksmen worked four hours, exploding six charges of nitroglycerin on its door without results. The chest consists of a hollow cubical casting that is drill-proof, with a round door. The latter fits so tightly that no liquid can be forced between it and the jamb.



The New Burglar-Proof Chest, and a Safe, Containing Such a Chest, on Which Burglars Worked Four Hours, Unsuccessfully

COMBINATION FIVE-DOLLAR AND TEN-DOLLAR BILL

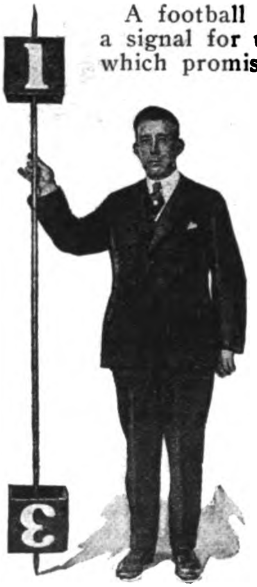
A druggist in Waukegan, Ill., while counting his money recently, chanced to turn over one of the five-dollar bills and was astonished to find that on the other side it was a ten-dollar bill. Treasury-department men explain the anomaly on the theory that one side of a sheet which had been printed for five-dollar notes was accidentally backed up on the press with ten-dollar note form.

¶An American company has been authorized to make studies for an underground telephone system in Montevideo, Uruguay.

CROSS-ATLANTIC FLIGHT PRIZE AGAIN OFFERED SPORTSMEN

Announcement has been made by the Royal Aero Club of Great Britain of the reposting of the Daily Mail's $50,000 transatlantic-flight prize. The terms of the contest remain the same as in the past. The award will be made to the first airman who completes, within 72 hours or less, a flight between any point in the United States, Canada, or New Foundland, and any point in Great Britain or Ireland. A machine may not alight on land en route, but it may do so on water and likewise halt for repairs. There are a number of machines now under construction in America and elsewhere for the purpose of crossing the Atlantic. There is good reason to assume that before many months have elapsed, an attempt will have been made to accomplish this feat, which would have been undertaken in 1914, except for the outbreak of the war.

FOOTBALL SIGNALS SHOW DOWNS AT A GLANCE



A football coach has patented a signal for use on the gridiron which promises to be much appreciated by players, officials, and spectators, for it enables them to ascertain the downs at a glance. It consists of a rod usually carried by the lineman, near either end of which are four panels forming four sides of a cube. At one end two opposite panels are numbered "1" and the other pair "2." On the other end are panels "3" and "4." During the period of the first down the end of the pole bearing the "1's" is held uppermost, with the proper panels facing the players and spectators. With each successive down the signal is changed accordingly. The rod is collapsible and the numbered panels fold flat, so that the signal can be carried in a small case.

AMERICAN FLIERS USED RADIO-TELEPHONES IN BATTLE

One of the highly important American military secrets that was disclosed upon the conclusion of hostilities, concerned the use of radio-telephony by our airmen in battle. The United States of all the nations at war, was the only one whose air fleets were maneuvered, and whose pilots and observers were in constant communication with headquarters, by means of the spoken word.

Credit for adapting the wireless telephone for aeronautical use belongs to Col. C. C. Culver, who spent 10 years in perfecting the invention. The first that was publicly known of the officer's work was contained in an announcement made at San Diego, Feb. 7, 1917, that Colonel Culver had supervised a successful test of a wireless telephonic apparatus, and that a conversation had been held between a land post and an army aeroplane in flight. Following that, little or no information was given circulation. In December following, however, the first successful demonstration was conducted before the Aircraft Board, and the joint Army and Navy Technical Board at Dayton, Ohio. At that time two planes were used. Those aboard them communicated with each other freely, and also conversed with operators at a ground station. Members of the boards were supplied with receiving apparatus and "listened in" on the conversations, which they heard as distinctly as if the words had been transmitted by wire.

PHOTOS COPYRIGHT, INTERNATIONAL FILM SERVICE

Above is Shown How Wireless Telephone Transmitter and Receivers are Worn by a Pilot. The Insert Pictures Witnesses of the Demonstration at Bolling Field Listening to Orders Issued by a Flight Commander Aloft

In October, previous to the Dayton test, Colonel Culver sailed to France with experimental sets of the apparatus, and subsequently conducted demonstrations for the benefit of our air forces overseas. Early in the summer of last year several thousand sets of apparatus were distributed among training camps in the United States and dealt out to the expeditionary air forces. Use of the equipment was made chiefly in bombing operations. There is reason to believe that the existence of the system remained a mystery to the Germans until the last, although reports have been circulated that the enemy's aeronautic department did get an inkling of the secret just before the armistice was signed. There is, however, no documentary evidence to support this claim.

Since the conclusion of fighting two interesting demonstrations have been made in this country. One of these took place at Roosevelt Field, November 15 and 19. De Haviland planes were put through evolutions by verbal command. In this connection it is interesting to note that use of the radio-telephone makes it unnecessary for the commander of an aerial squadron to fly at the head of the formation where he can be in plain view.

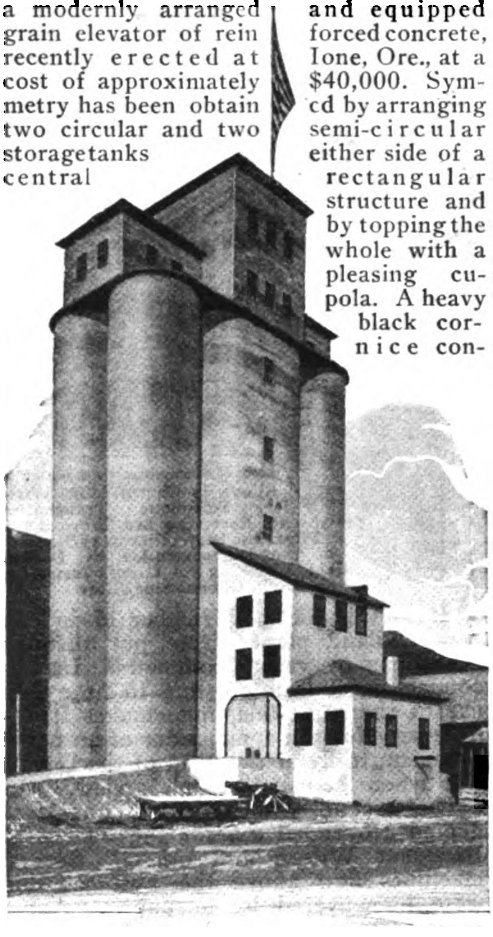
The second demonstration was conducted November 22, for the benefit of President Wilson and others. Several machines flew above the Potomac and were maneuvered by telephone. Apparatus installed at the White House enabled the president and his party to hear the exchange of messages and issuance of orders while watching the planes go through their evolutions with perfect military precision.

It is understood that before the war ended the apparatus had been tried out by British and French air squadrons, but it had not been placed in regular use by them.

Technical details of the invention are yet to be made public. It is permissible, however, to mention a few general features which do not disclose intimate phases of its construction. Perhaps the most interesting point concerns the method employed to prevent foreign noises from interfering with the transmission of messages. Briefly, the secret is this: The apparatus is so tuned as to be affected only by sounds that exceed 200 vibrations a second. This provides for the human voice, but excludes motor, machine gun, and shell noises.

ARTISTIC GRAIN ELEVATOR HAS SPECIAL FEATURES

Lines as pleasing as those of an old-world castle have been incorporated into a modernly arranged and equipped grain elevator of reinforced concrete, recently erected at Ione, Ore., at a cost of approximately $40,000. Symmetry has been obtained by arranging two circular and two semi-circular storage tanks either side of a central rectangular structure and by topping the whole with a pleasing cupola. A heavy black cornice contrasts sharply with the white finish of the walls. The ground dimensions are 62 by 33½ ft., and its height is 124 ft., over all. It contains a total of 20 bins with a capacity of 100,000 bu. A special feature is the arrangement of these bins so as to allow an unobstructed floor space of 12 by 33 ft. on the same level as the car floors. The construction is such that the weight of the overhanging bins is transferred to points of contact in the solid slab of concrete beneath the building.

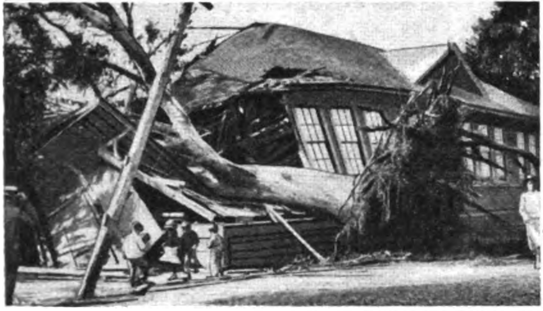


New 100,000-Bushel Grain Elevator at Ione, Oregon Which Is Distinctive on Account of Its Unusually Artistic Exterior, Its Conveniently Arranged Interior, and Its Up-to-Date Equipment

TESTS SHOW AMERICAN SOLDIER TO BE HIGHLY INTELLIGENT

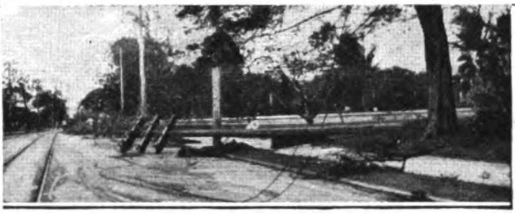
Mentality tests conducted by the Division of Psychology of the Medical Department and taken by approximately 1,500,000 of our soldiers, have disclosed some significant information. More than 26 per cent of the enlisted men who were examined were found to be considerably above the average in intelligence. About 48 per cent of the officers tested were graded as having "very superior intelligence." From eight to 10 soldiers out of every 100 received "B" classification, which is "superior intelligence." From 15 to 18 per cent of the men showed themselves to have "high average intelligence," and 58 per cent of the noncommissioned officers fell into the same group. Only about 11 per cent of the noncoms received as low a rating as "C," which stands for "average intelligence," the rating given 25 per cent of the soldiers. About a fifth of those who were examined received the marking of "C minus," which is the grade for "low average intelligence." Such men, although unfit for leading others, usually make good privates and do satisfactory routine work. Most of the 15 per cent who fell into "D" group, meaning "inferior intelligence," are illiterate or foreign. Slightly over one per cent of the soldiers were found to be of "very inferior intelligence." Most of these have intelligence equal to that of a normal 10-year-old child. Some of them were recommended for discharge and others assigned to the "development battalion. The tests provided a reasonably dependable classification of the men according to their general intelligence. In this manner men of superior intelligence, many of them deserving of promotion, were discovered immediately. On the other hand, the formation of special organizations for work of a nature demanding superior mental strength, was materially aided.

HAWAIIAN ISLANDS SUFFER FROM TERRIBLE STORM



Schoolhouse in Honolulu, Hawaii, Wrecked by Immense Tree Overturned during Tornado

Another View of the School Shown at the Left: Fortunately It Was Empty When Damaged

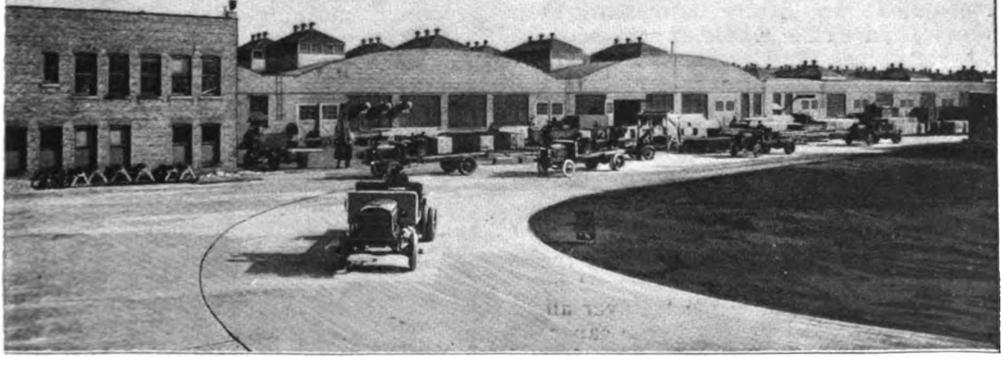


One of the Streets of Honolulu, Photographed after the Recent Storm, Strewn with Telephone Poles, Electric Wires, and Uprooted Trees

While enthusiastic residents of Hawaii contend that the islands have the finest climate in the world, none denies that the seasons are occasionally punctuated by terrific hurricanes. The accompanying photographs show some of the results of a recent uproar of the elements, which caused damage amounting to hundreds of thousands of dollars. It is said to have been one of the worst storms in the history of the islands. A schoolhouse, fortunately empty, was one of the buildings wrecked.

MOTOR-TRUCK TESTING TRACK BUILT AT DETROIT PLANT

Adjacent to one of the motor-truck factories at Detroit, a 1,760-ft. concrete track has been constructed to facilitate mechanics in putting new machines through the usual road tests. By having a private, paved course of this kind, the drivers are able to watch the performance of their cars more closely than when constantly contending with heavy traffic in city streets, and furthermore are always in reach of assistance when it is needed. It has been found that the track relieves trucks of much of the wear and tear heretofore suffered during tests, and that it also enables them to be kept cleaner.



The Paved Course, Free from Public Traffic, Materially Simplifies the Work of Testing New Motor Trucks, Besides Eliminating Much of the Wear and Tear to Which the Vehicles are Subjected When Tested on Ordinary Roads

Phonograph Detects Wireless Leak

By E. T. BRONSDON

"B-z-z-z-z-z-z-z-z-z-z-z!" Buzzing and sputtering, the spark was acting up. The French Intelligence Department, with receivers all tuned up for Nauen and Madrid, could make nothing out of the supposed message.

"Nothing there!" was the verdict of the wireless expert.

Headquarters thought differently. The Germans had known far too much concerning allied troop disposal in the Somme advance. News was getting across constantly; some of it was acted upon by the boches before ever allied troops in advanced positions could know of the changes made. Careful sifting had made a practical certainty of the theory that a neutral country was sending the news by powerful wireless. Further investigation had disclosed that in Madrid, Spain, an instrument was using the same wave length used habitually by Nauen, the great official station of the German empire. A little observation showed further that, at irregular times, both of these stations sent out these queer buzzings. It looked suspicious, to say the least.

For weeks afterward the allies kept experts busy on the strange problem. Every sort of instrument was tried, the theory being that perhaps some special receiving apparatus had been invented which made the buzzing jumble intelligible. The British who were called in to wrestle with the problem were unanimous in the opinion that the noise, which never lasted more than a fraction of a minute, was due purely to some imperfections in the sending stations. No message of any kind, except possibly some code word agreed upon before the war, could be sent in this manner—surely no data concerning the movements of divisions or army corps, for the names of these alone would take more spark than was wasted on the whole of each of these "mystery messages." The French were polite, but unconvinced.

Still the buzzing continued from Nauen and from Madrid, though more often from the latter. The leak, also, was growing worse. It had become so bad that the French organized a phantom attack under General Debeneau. With only that general and headquarters staff in "on the know," three divisions were scheduled to hammer the German front on a certain August morning. Two days previous to the imaginary attack the Germans on this front abandoned three moderately dangerous positions which they had held stubbornly to that time! Patrols sent out to reconnoiter reported a huge force of *stosstruppen* grimly waiting to annihilate the three divisions, which naturally never went over the top.

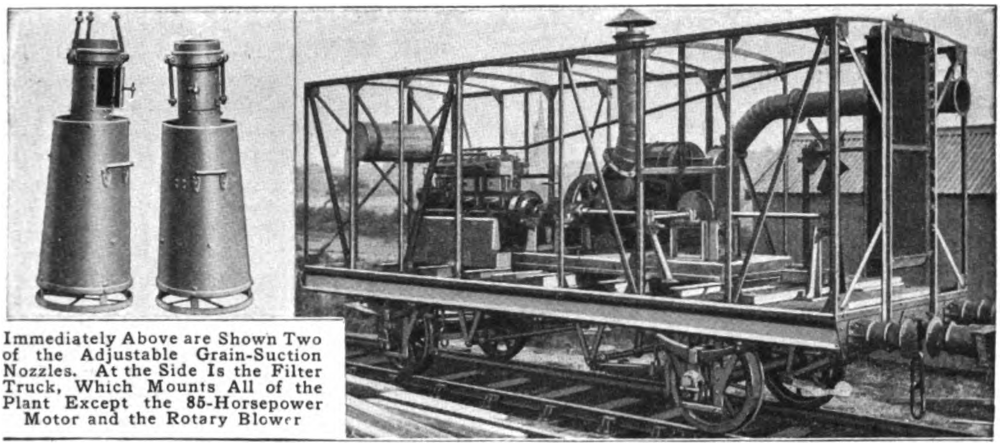
Positive orders went out to "tune up" on Madrid. Obeying this mandate, the Intelligence Department finally discovered the trick. A certain investigator, at his wit's end, attached a phonograph with a blank record to the receiving station which was investigating Madrid. When the buzzing came it was inscribed on the soft wax of a record. This first attempt yielded no specific result, but it furnished a hint. Running the record at two or three revolutions to the minute, several experts thought they detected certain letters.

Immediately another trial was made. This time the blank record was run 300 revolutions to the minute.

The buzzing was caught. When the record was re-run at lower speed the code message was obtained! Then, of course, the problem was simplicity itself; no German ever yet has been able to evolve a code which the French Intelligence Department could not decipher in its sleep. The message, as expected, gave a wealth of details that no German was supposed to know. Soon after, Nauen came through with questions which Madrid would answer as soon as possible.

The scheme really was simple. In each of these stations reels for holding a perforated-tape message had been attached to the wireless sending apparatus. A mechanism essentially like that which reproduces from music rolls on a player-piano took the message from the perforated roll and sent it out in ether waves at from 300 to 400 words a minute! At either end a phonograph picked up the seemingly meaningless jumble, and ordinary steel needles reproduced it.

It is doubtful if the Germans ever found out that the French were on to their scheme, for on occasion, until nearly the end of the war, the device was used. Needless to say there always was a third party "on the line"—and it is certain that none of the information that subsequently went through ever bothered the allied armies. Through various ruses. and through the leading questions asked by Nauen, the French were able to pick up many spies that they never would have suspected under ordinary circumstances, thus closing up most of Fritz's reliable sources of information.



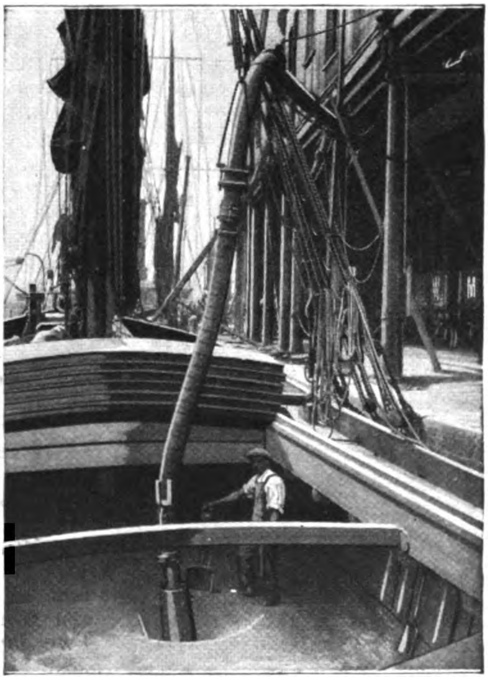
Immediately Above are Shown Two of the Adjustable Grain-Suction Nozzles. At the Side Is the Filter Truck, Which Mounts All of the Plant Except the 85-Horsepower Motor and the Rotary Blower

RAILWAY CARS MOUNT GRAIN-UNLOADING EQUIPMENT

Because of the necessity, during the war, of unloading ships at whatever port they might enter, a novel, portable, pneumatic grain-unloading equipment was developed in England, and placed in use shortly before the conclusion of fighting. In principle the appliance is quite familiar, but its arrangement is another thing. The plant is mounted on two typical English railway carriages and is designed to be dispatched from point to point by rail, as needed. Its purpose is to facilitate the unloading of grain at ports that lack suitable facilities. Grain is sucked from a ship through an adjustable nozzle into the transport line, which consists of 12-ft. lengths of pipe joined together by special couplings. A series of trestles supports the artery between the cars and the edge of the dock, while at different points it is fitted with ball joints to permit changes in position and alinement.

One of the cars is known as the filter truck. It mounts the receiving chamber, into the bottom of which the grain first falls. There the grain enters a discharger, consisting of a bucket wheel rotating within a close-fitting casing, and is fed to a chute that drops it on a band conveyor delivering into the hopper of an elevator at one end of the car. The latter carries it to the dock's weighing truck, which weighs and sacks it. Triple filters, consisting of nests of closely woven canvas tubes, are also mounted on this car. Air in passing to the blower must traverse these strainers and be freed of all dust and foreign particles. The accumulated dirt is trapped within the tubes, from which it is readily removed for weighing, when this is necessary in order to check the weights given in invoices.

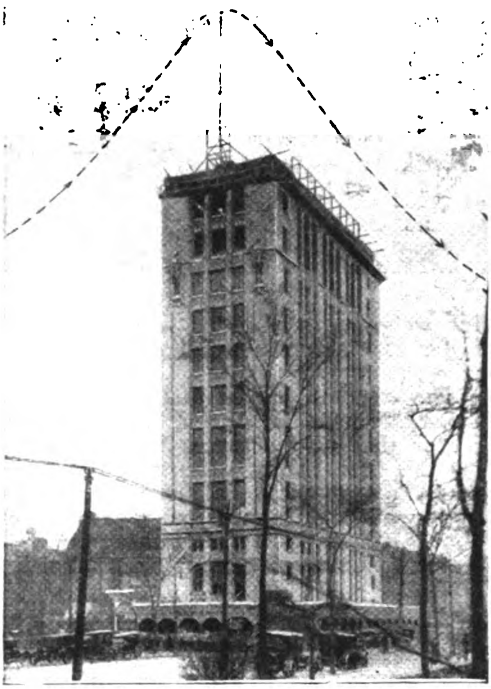
The second car mounts the rotary blower, which is driven by an 85-hp. motor that also actuates the machinery on the first truck. The maximum capacity of the plant is about 33 tons an hour when conveying from a distance of about 100 ft. The fuel consumption is stated to be seven gallons of gasoline an hour.



Unloading a Small Grain Boat with the Portable Pneumatic-Conveyor Plant: The Adjustable Nozzle is Clearly Shown

FLIER KILLED WHEN PLANE STRIKES FLAGSTAFF

While rejoicing in the signing of the armistice, thousands of Detroit citizens filling the streets of their city were thrilled by the daring feats of an airman above them. Several times he looped so low that the throng held its breath until he rose again in safety. But just when the tension was somewhat relieved the flier made another dip close to the trees, and in rising to pass over a near-by building, missed calculations by a few inches. One wing of the aeroplane struck and was torn by the tip of the building's tall flagstaff from which had flown many times the emblem that was being honored by the celebration in the street below. The tear left the wing useless and, turning sharply, the machine plunged its nose into the roof of a structure not far away. The flier, badly crushed, died shortly after, and his companion suffered a broken leg.



Flagstaff on a Detroit Building Which Caused a Flier's Death: Dotted Line Shows Path of the Machine, One Wing of Which Caught on the Tip of the Pole

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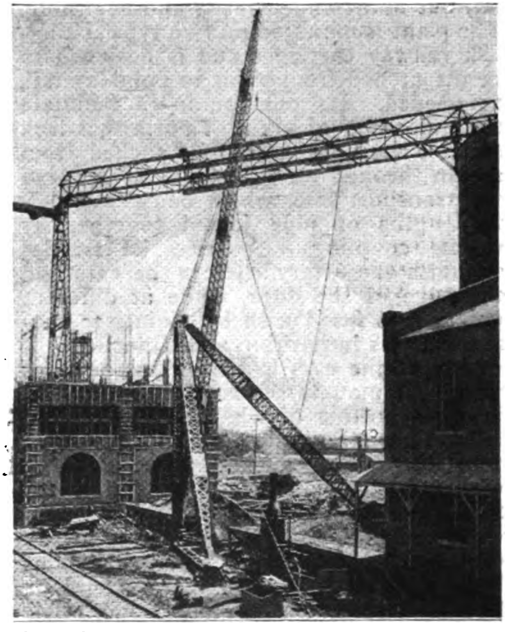
¶A large number of Dutch workmen formerly employed at the Krupp works in Germany have recently returned to that plant and are now said to be engaged in constructing railway material.

SUBSTITUTES FOR PETROLEUM IN MINERS' LAMPS TRIED

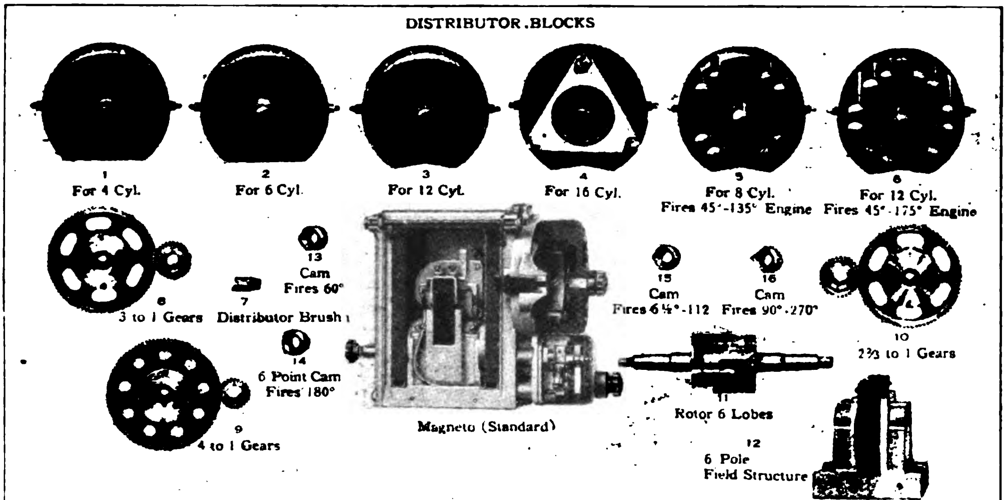
Extensive investigations, including practical tests by miners, have been made in Spain of substitutes for petroleum as a fuel for miners' lamps. One mixture which has found a degree of favor among underground workers contains 77.5 per cent of 96° alcohol, and 22.5 per cent benzol. A principal objection to this fuel is that the illuminating power of a lamp burning it is but 77 per cent of a standard petroleum lamp. To remedy this, a mixture has been tried consisting of 62 per cent, by volume, of the alcohol mentioned above, 16 per cent of benzol, 7.5 per cent of rectified turpentine, and 14.5 per cent of fusel oil.

EXTRA-LONG DERRICK BOOM FOR SPECIAL JOB

To erect galleries for a belt conveyor in a Minneapolis plant, the engineers found that hoisting apparatus of unusual dimensions was necessary, and accordingly increased the length of a derrick boom to 132 ft., which is exceptional for equipment used in factory construction. The giant arm was placed almost perpendicularly, and with it the steel frames of the galleries were raised onto their supports in the ordinary manner.



Derrick with Boom Lengthened to 132 Feet, Used in Raising the Steel Frame of a Belt-Conveyor Gallery to the Lofty Position Shown Here

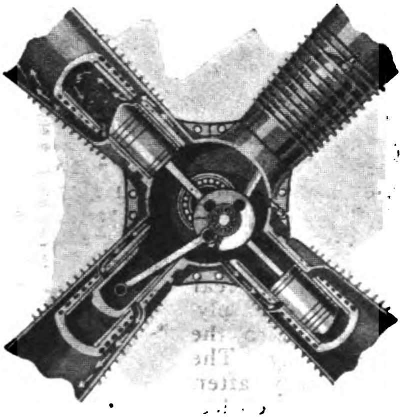


For 4 Cyl. Engines	For 6 Cyl.	For 12 Cyl.	For 16 Cyl.	For 8 Cyl.	For 12 Cyl.
1 Block	2 Block	3 Block	4 Block	5 Block	6 Block
14 Cam	8 Gears	8 Gears	10 Gears	9 Gears	8 Gears
	14 Cam	7 Dist. Brush	13 Cam	16 Cam	15 Cam
			7 Dis. Brush	7 Dist. Brush	7 Dist. Brush
			11 Rotor		11 Rotor
			12 Field Structure		12 Field Structure

CONVERTIBLE MAGNETO SUITED FOR ALL AEROPLANE MOTORS

AMONG the war-inspired American inventions of importance that may now be discussed freely, there is a standardized magneto that is capable of conversion to seven different models. These assemblies accommodate all aeroplane engines in general use. Obviously this eliminates the necessity of keeping a large assortment of different types of magnetos and hundreds of spare parts at supply depots. The new instrument has been adopted by the United States government as the standard aeroplane magneto, and praised highly by England, France, and Italy. Sixteen extra parts enable the various changes necessary for four, six, eight, 12, and 16-cylinder motors, and eight, 12, and 45° cylinders, to be made. Six of these parts are distributor blocks, and three of them gear combinations.

AERIAL MOTOR BUILT INTO PROPELLER



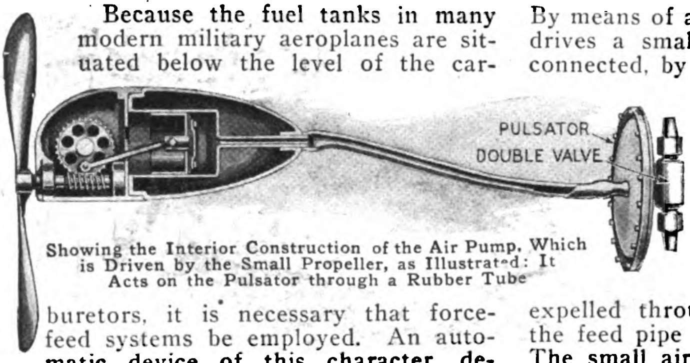
BY COURTESY OF THE MOTOR CYCLE, LONDON

Phantom Drawing, Showing How the Four Cylinders of the Novel Rotary Motor are Incorporated in a Four-Blade Propeller

Of interest because of its radical departure from standard practice is a four-cylinder, two-stroke rotary aeroplane engine, of recent development in England, that is arranged to form an integral part of a four-blade propeller. Those who have followed closely the trend in other fields will recognize the self-contained unit as an aeronautic application of similar ideas already utilized in motorcycle, automobile, and tractor designing of late. While in most of its particulars the present invention demands no detailed explanation, it might be mentioned that the propeller blades are constructed of metal and utilized as exhaust-expansion chambers. Owing to centrifugal force, this plan insures excellent scavenging of the spent gases, it is asserted. The merits of the invention are yet to be demonstrated, but regardless of this the features are interesting.

¶It was recently announced that a new synthetic process of making glycerin in quantity by fermentation of sugar, at low cost, was perfected for our government and kept secret, for use in explosive making. The process, which probably will revolutionize glycerin production, was found following reports that Germany had discovered a like method. America also gave the allies the benefit of its secret.

NEW FORCE-FEED SYSTEM USED ON FRENCH PLANES



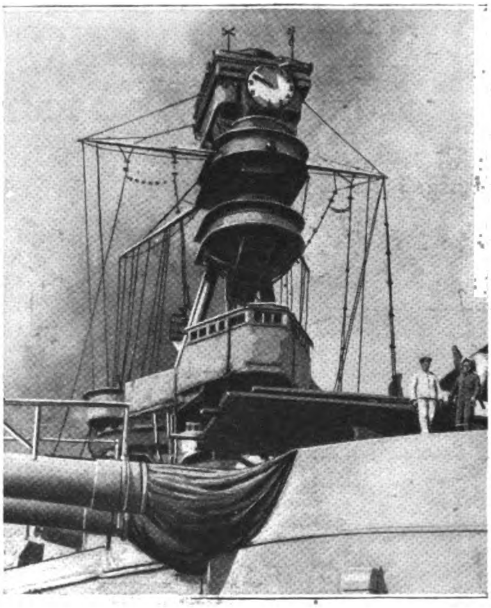
Showing the Interior Construction of the Air Pump, Which is Driven by the Small Propeller, as Illustrated: It Acts on the Pulsator through a Rubber Tube

Because the fuel tanks in many modern military aeroplanes are situated below the level of the carburetors, it is necessary that force-feed systems be employed. An automatic device of this character, designed to be operated by a miniature air propeller, is used on certain French craft. By means of a worm and gear, the screw drives a small pneumatic pump that is connected, by means of a reinforced-rubber tube, with a pulsator. The latter is joined to a two-way valve fitted in the line between the fuel tank and motor. Gasoline is drawn through the first valve and into the pulsator on the suction stroke, and expelled through the second valve into the feed pipe on the compression stroke. The small air motor is geared so as to operate uniformly, making one full stroke a second.

FASTEST AND MOST MYSTERIOUS WARSHIP AFLOAT

Of the many sensational stories that have come out of the war, none is more fascinating than that of Great Britain's so-called "mystery" ships. Three of these astonishing vessels are said to be afloat, and photographs are now at hand to take the place of the official confirmation that has been lacking. Pictures, of course, prove nothing concerning the amazing performance accredited to the craft, but at least they strengthen conviction that there is something remarkably unusual about these ships over which an almost impenetrable veil of secrecy has been thrown.

Briefly, it is asserted that one of these mysterious ships carried Foreign Minister Balfour across the Atlantic in three days, when the Siberian situation made his presence in Washington highly necessary in the interest of the allied cause. Also it is claimed that a group of British army officers was enabled to reach Vancouver eight days after leaving London and there join the Siberian expedition. One of the fast vessels is understood to have carried the officers to Halifax, where special railway accommodations awaited them.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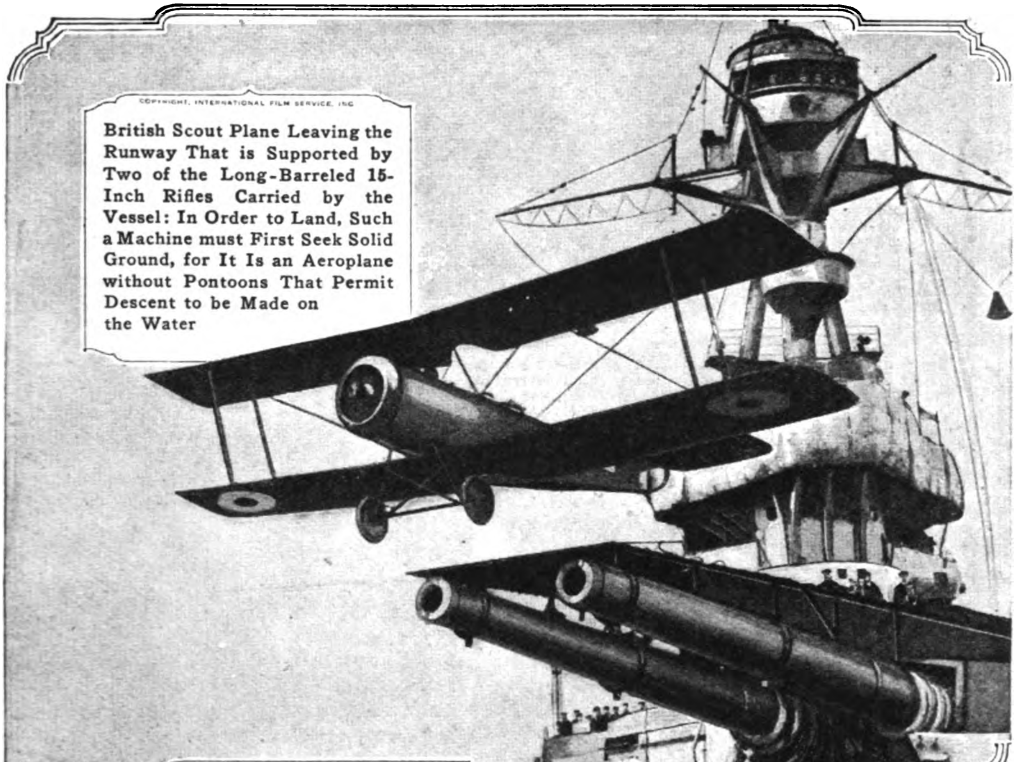
Bow View of the "Renown," One of the British Navy's 60-Mile an Hour Warships, Showing Its Watch Tower and the Clock It Carries Atop

Sixty-two miles an hour is the remarkable speed that the astonishing ships are claimed to have shown in official tests. Fifty-six miles an hour is the equally astonishing "average daily speed" they are supposed to have maintained in all kinds of seas. For a great ship to journey 1,341 miles in a single day is something new under the sun.

According to reports that seem to be borne out by photographs, the ships are of the cruiser type so far as appearance is concerned. They are described as being larger than destroyers, and armed with 15-in. rifles mounted in fore and aft turrets.



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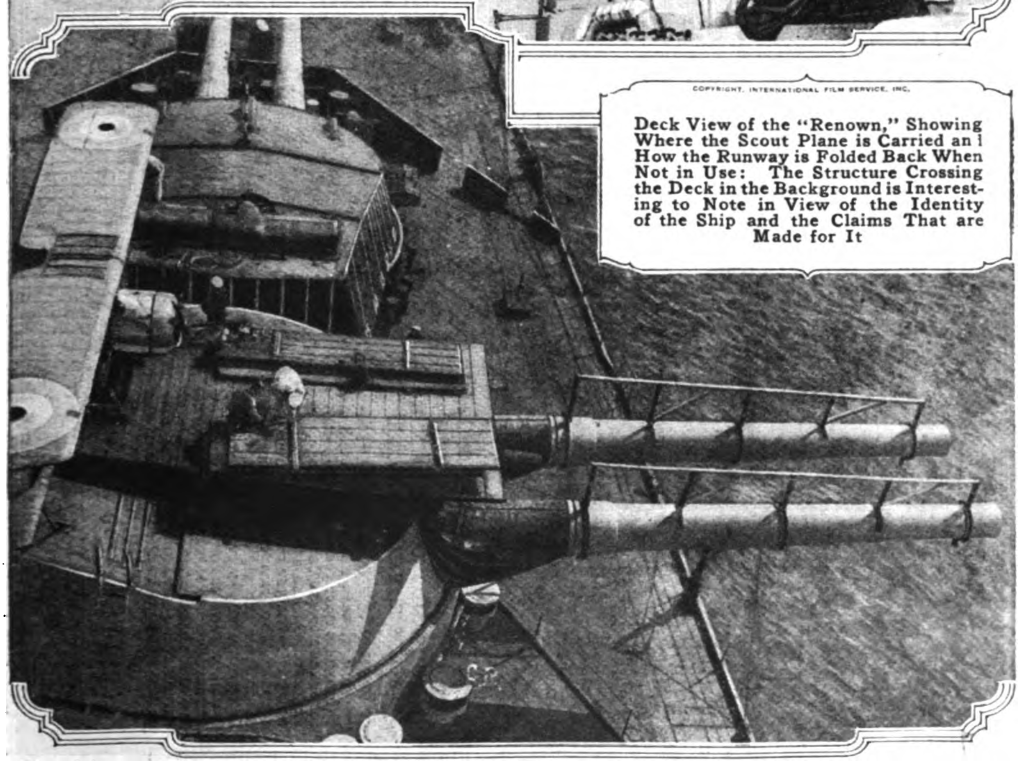
British Scout Plane Leaving the Runway That is Supported by Two of the Long-Barreled 15-Inch Rifles Carried by the Vessel: In Order to Land, Such a Machine must First Seek Solid Ground, for It Is an Aeroplane without Pontoons That Permit Descent to be Made on the Water



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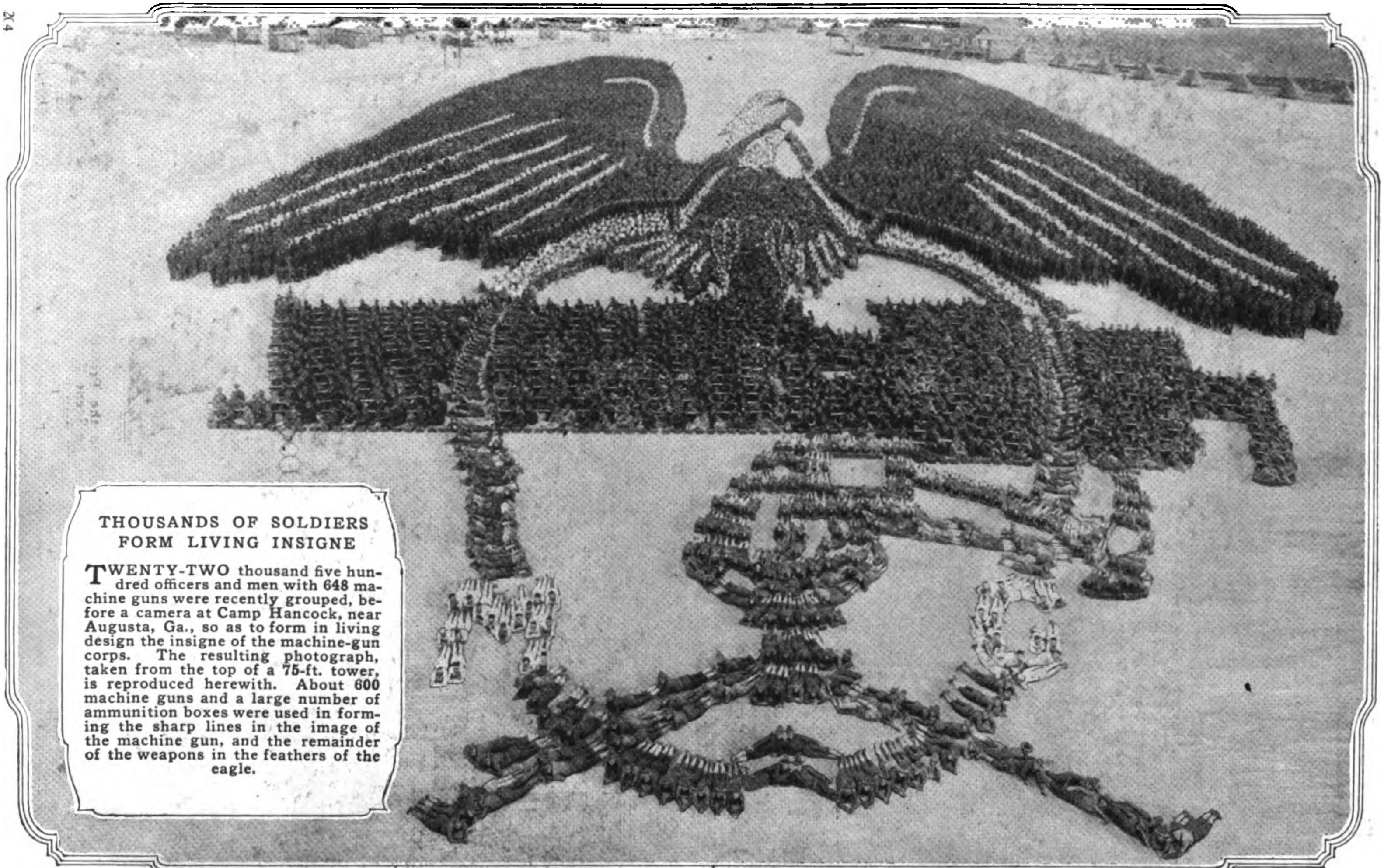
Deck View of the "Renown," Showing Where the Scout Plane is Carried and How the Runway is Folded Back When Not in Use: The Structure Crossing the Deck in the Background is Interesting to Note in View of the Identity of the Ship and the Claims That are Made for It



THOUSANDS OF SOLDIERS FORM LIVING INSIGNE

TWENTY-TWO thousand five hundred officers and men with 648 machine guns were recently grouped, before a camera at Camp Hancock, near Augusta, Ga., so as to form in living design the insigne of the machine-gun corps. The resulting photograph, taken from the top of a 75-ft. tower, is reproduced herewith. About 600 machine guns and a large number of ammunition boxes were used in forming the sharp lines in the image of the machine gun, and the remainder of the weapons in the feathers of the eagle.

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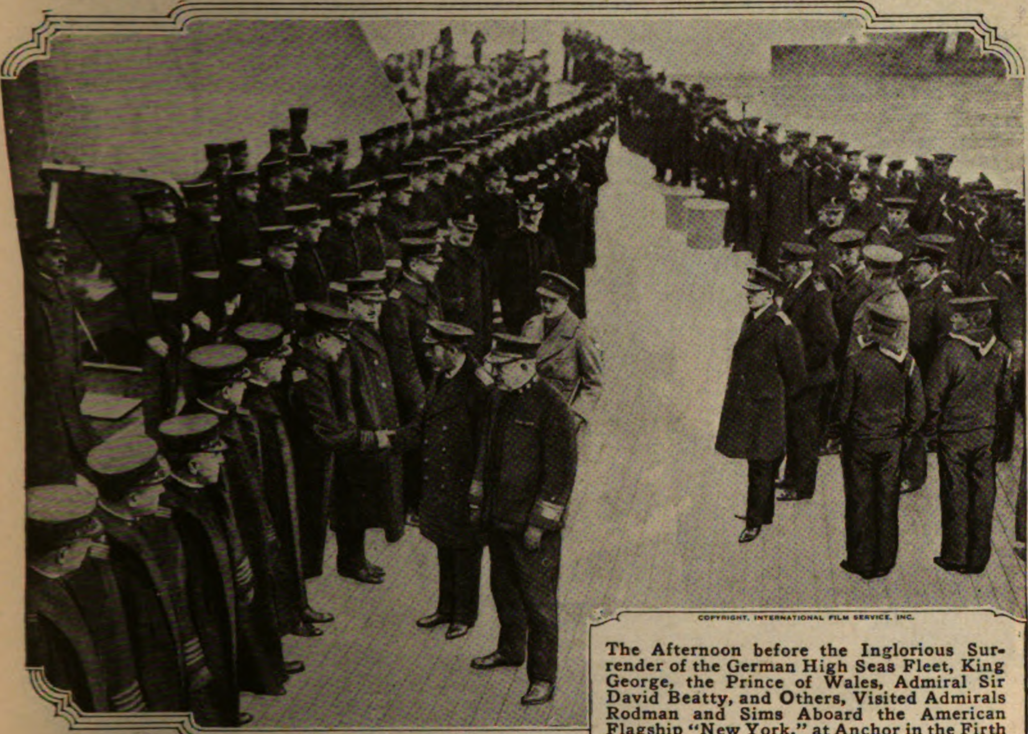
GRAND WIND-UP, ON LAND AND SEA, OF GREAT WAR



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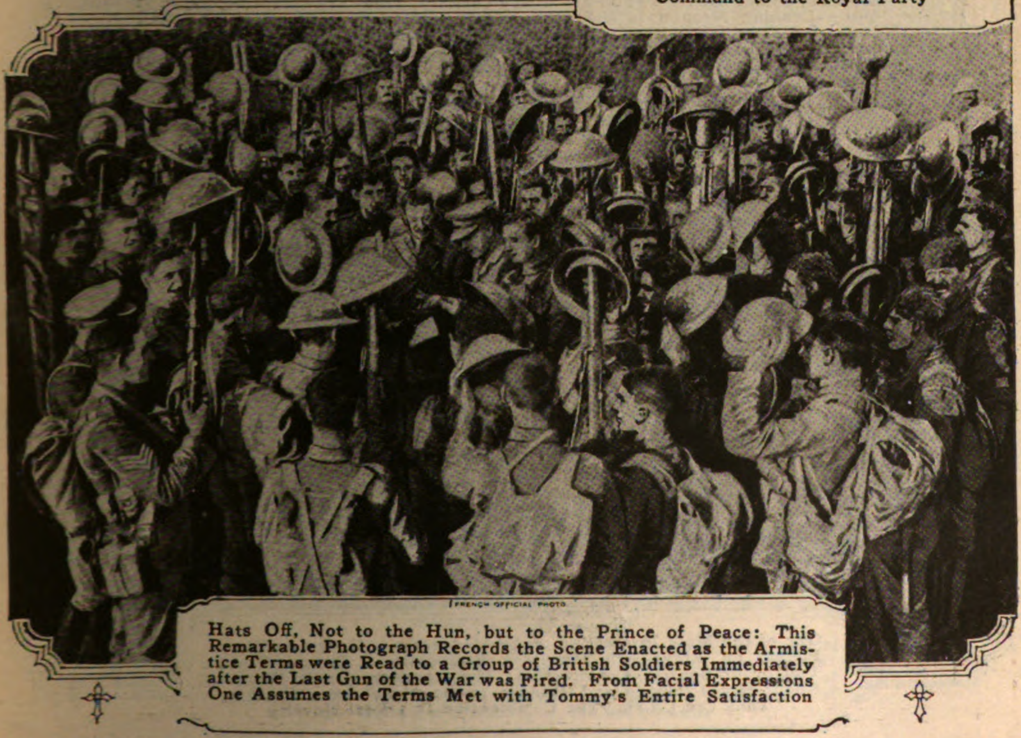
The Afternoon before the Inglorious Surrender of the German High Seas Fleet, King George, the Prince of Wales, Admiral Sir David Beatty, and Others, Visited Admirals Rodman and Sims Aboard the American Flagship "New York," at Anchor in the Firth of Forth. The Accompanying Picture Shows Admiral Rodman Introducing Officers of His Command to the Royal Party



FRENCH OFFICIAL PHOTO

Hats Off, Not to the Hun, but to the Prince of Peace: This Remarkable Photograph Records the Scene Enacted as the Armistice Terms were Read to a Group of British Soldiers Immediately after the Last Gun of the War was Fired. From Facial Expressions One Assumes the Terms Met with Tommy's Entire Satisfaction

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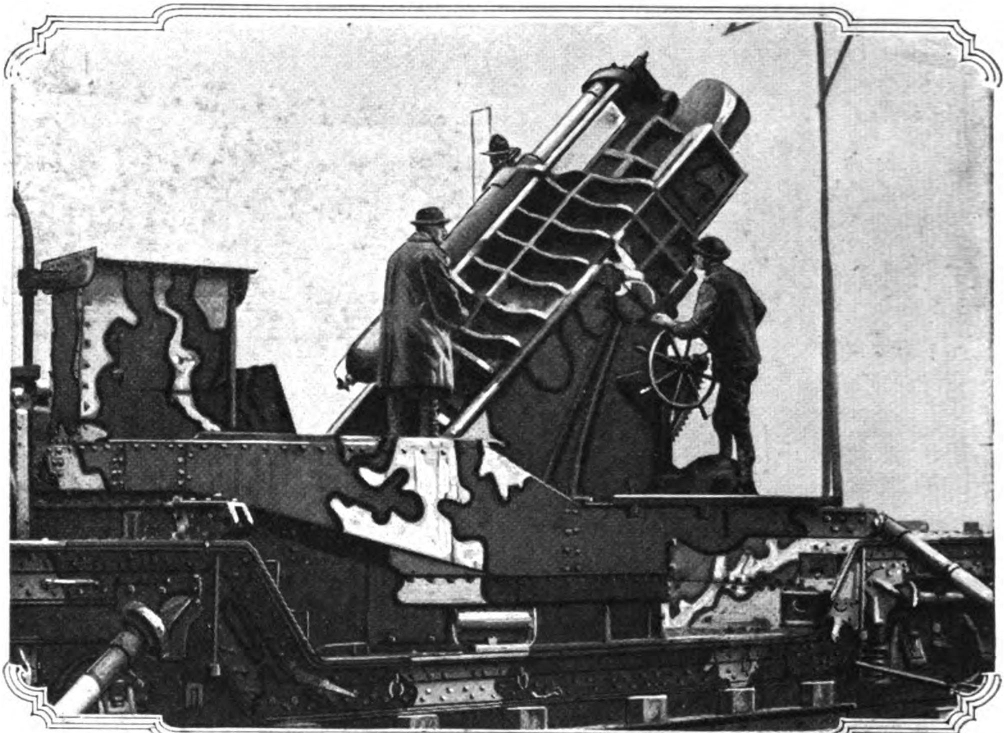
SOME OF AMERICA'S BIG ARTILLERY BATTERIES



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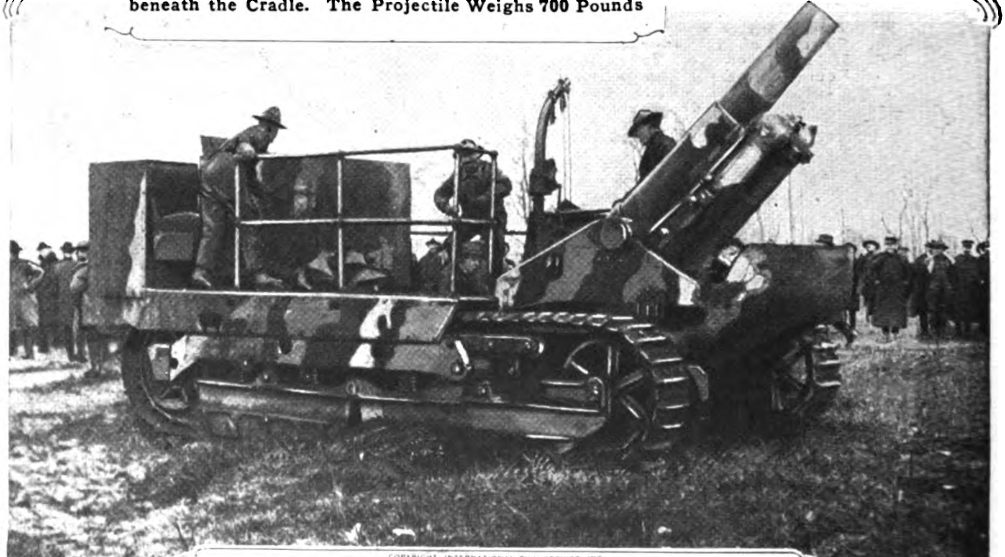
Modified Somewhat for Use on a Railway Carriage, This Queer-Looking Weapon Is a Standard 12-Inch Coast-Defense Mortar. The Recuperator Is Hydropneumatic and of Special Design. There Are Two Recoil Brakes beneath the Cradle. The Projectile Weighs 700 Pounds



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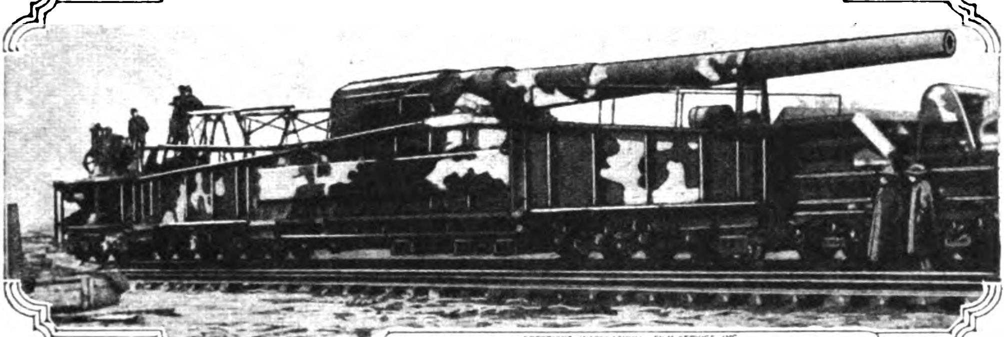
One of the Most Interesting of All of America's Heavy Artillery Pieces, an Eight-Inch Howitzer Built into a Creeper-Tread Tractor of Special Construction: The Complete Outfit Weighs About 55,000 Pounds and Is Able to Go Anywhere a Fighting Tank can Climb. The Combination **Is a Real Novelty**

ON MOBILE MOUNTINGS SEEN AT CLOSE RANGE



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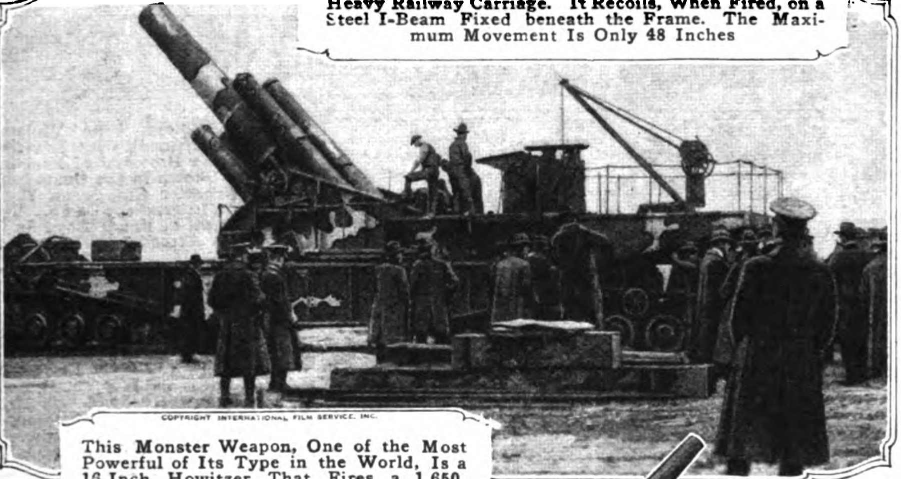
Showing the Daubing of Camouflage Artists: One of Our Long-Range 14-Inch Naval Guns Mounted on a Heavy Railway Carriage. It Recoils, When Fired, on a Steel I-Beam Fixed beneath the Frame. The Maximum Movement Is Only 48 Inches



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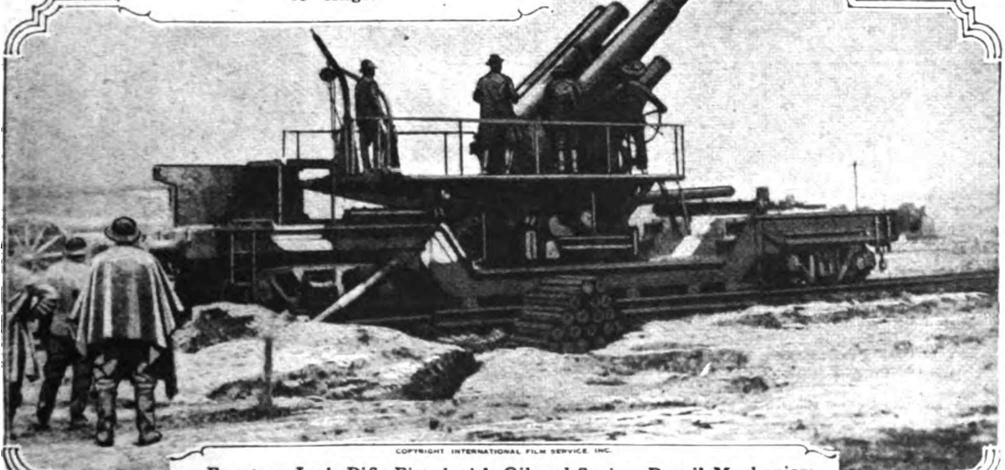
This Monster Weapon, One of the Most Powerful of Its Type in the World, Is a 16-Inch Howitzer That Fires a 1,650-Pound Projectile Approximately 24,000 Yards. The Barrel may be Raised to a 65° Angle



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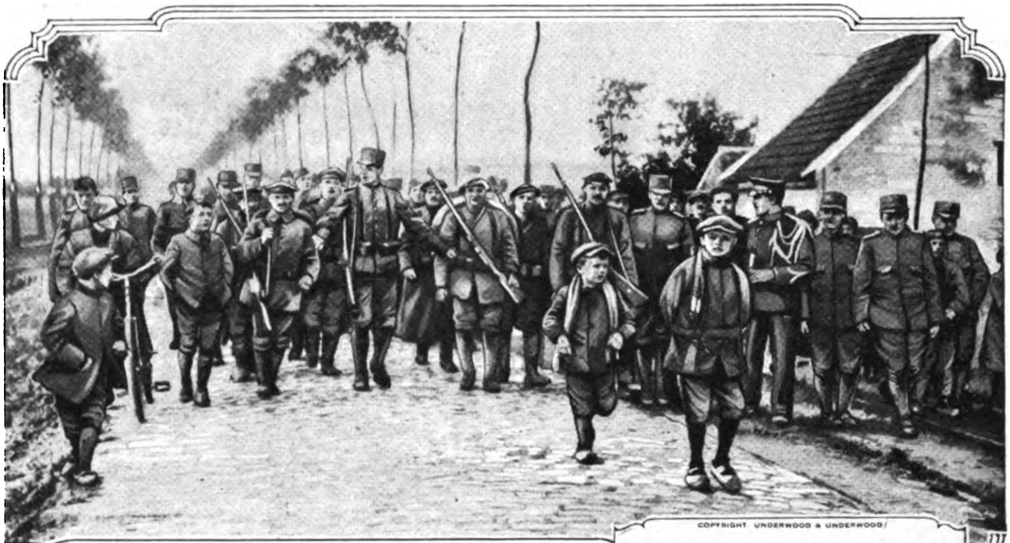
Fourteen-Inch Rifle Fitted with Oil-and-Spring Recoil Mechanism **and Mounted in the Well of a Specially Designed Railway Truck: Its Projectile Weighs 1,200 Pounds and is Hurled a Distance of About 40,000 Yards. The Weight of the Gun and the Car Complete Amounts to 400,000 Pounds**

RANDOM CAMERA SHOTS FROM DEVASTATED EUROPE



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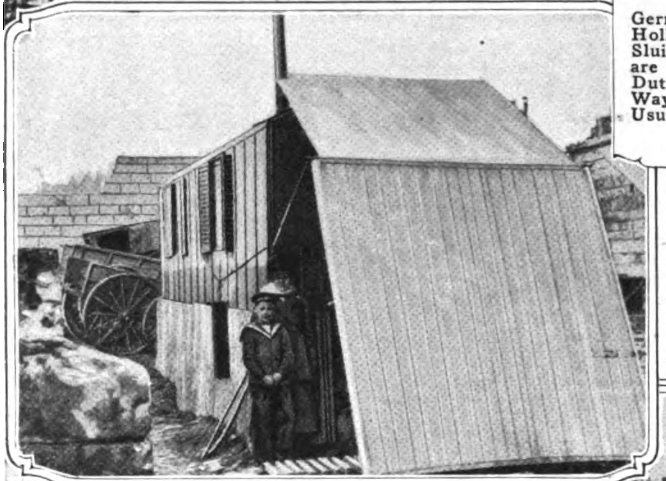
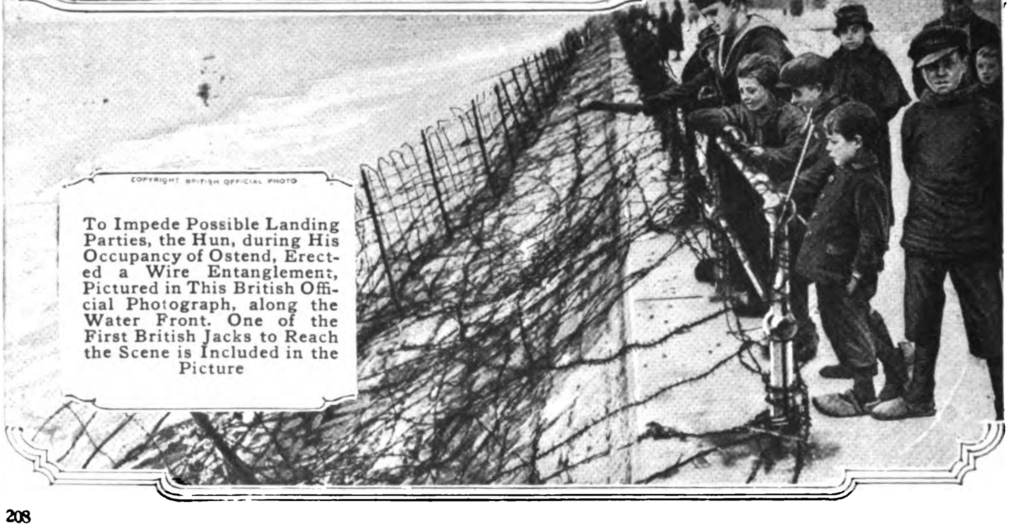
German Soldiers, Who Violated Holland's Neutrality by Entering Sluis, in the Province of Zeeland, are Here Shown in the Custody of Dutch Frontier Guards on Their Way to an Internment Camp. The Usual Crowd of Small Boys Is in Attendance



This Strange-Looking Shanty, One of the Portable Houses Erected in France by the American Red Cross, Shelters a Widely Known French Countess and Her Young Son. The Woman's Husband was Killed in the War and Their Chateau, Which Stood on the Site of the Present Humble Dwelling, Demolished



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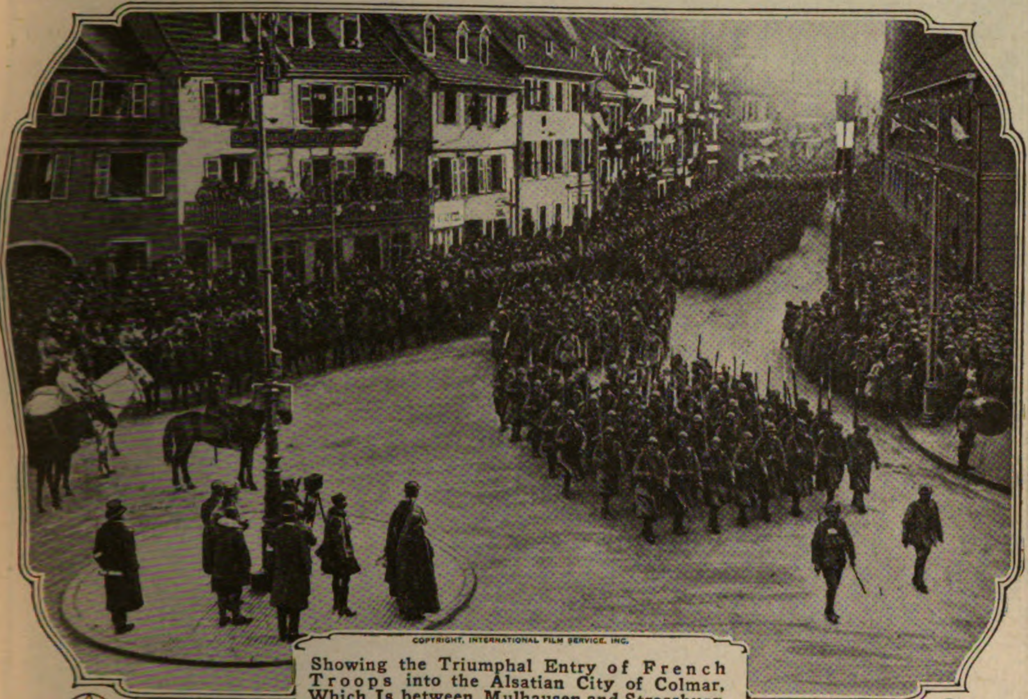
To Impede Possible Landing Parties, the Hun, during His Occupancy of Ostend, Erected a Wire Entanglement, Pictured in This British Official Photograph, along the Water Front. One of the First British Jacks to Reach the Scene is Included in the Picture

EPOCHAL GERMAN EVENTS PICTORIALLY TREATED



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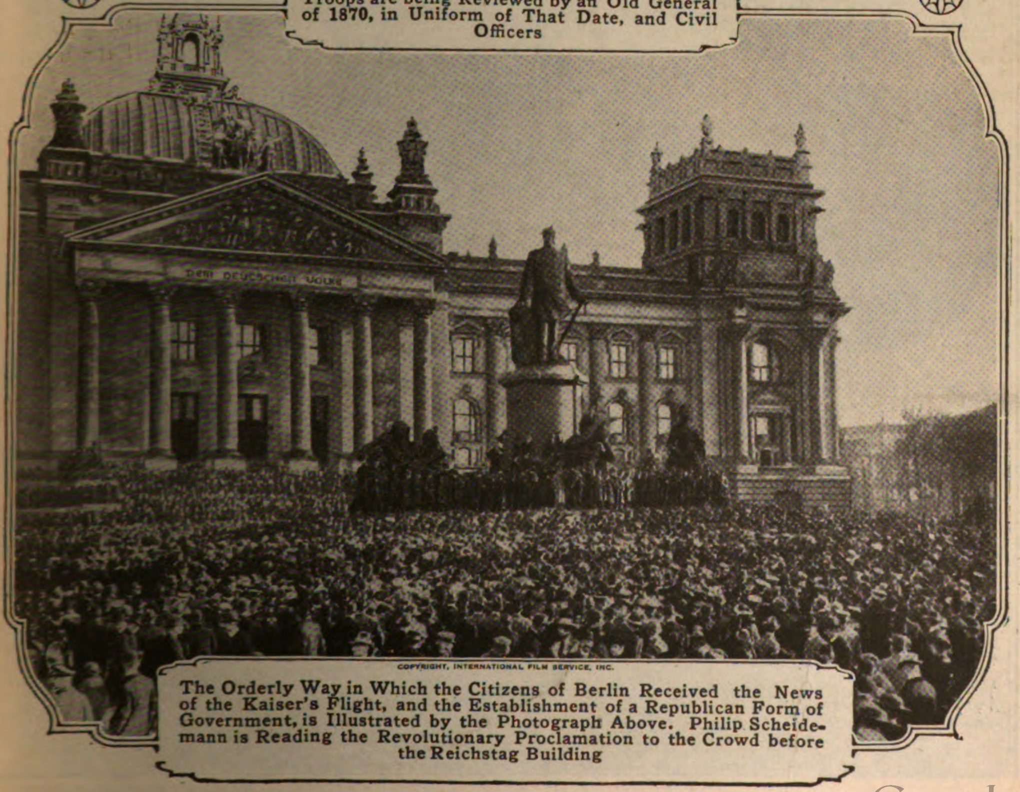
Showing the Triumphal Entry of French Troops into the Alsatian City of Colmar, Which Is between Mulhausen and Strassburg, Close upon the Heels of the Retiring Hun. The Troops are being Reviewed by an Old General of 1870, in Uniform of That Date, and Civil Officers



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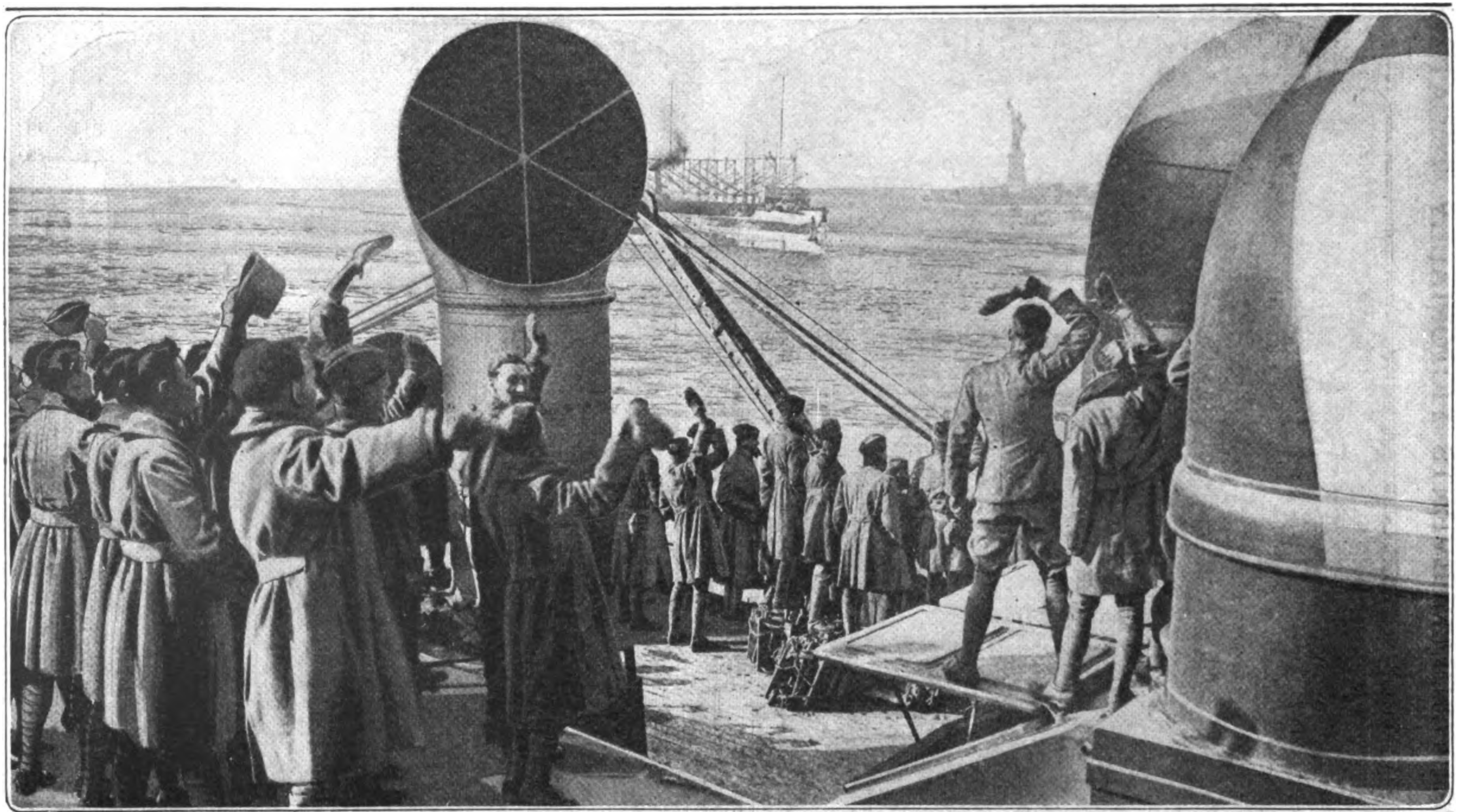
The Orderly Way in Which the Citizens of Berlin Received the News of the Kaiser's Flight, and the Establishment of a Republican Form of Government, is Illustrated by the Photograph Above. Philip Scheidemann is Reading the Revolutionary Proclamation to the Crowd before the Reichstag Building



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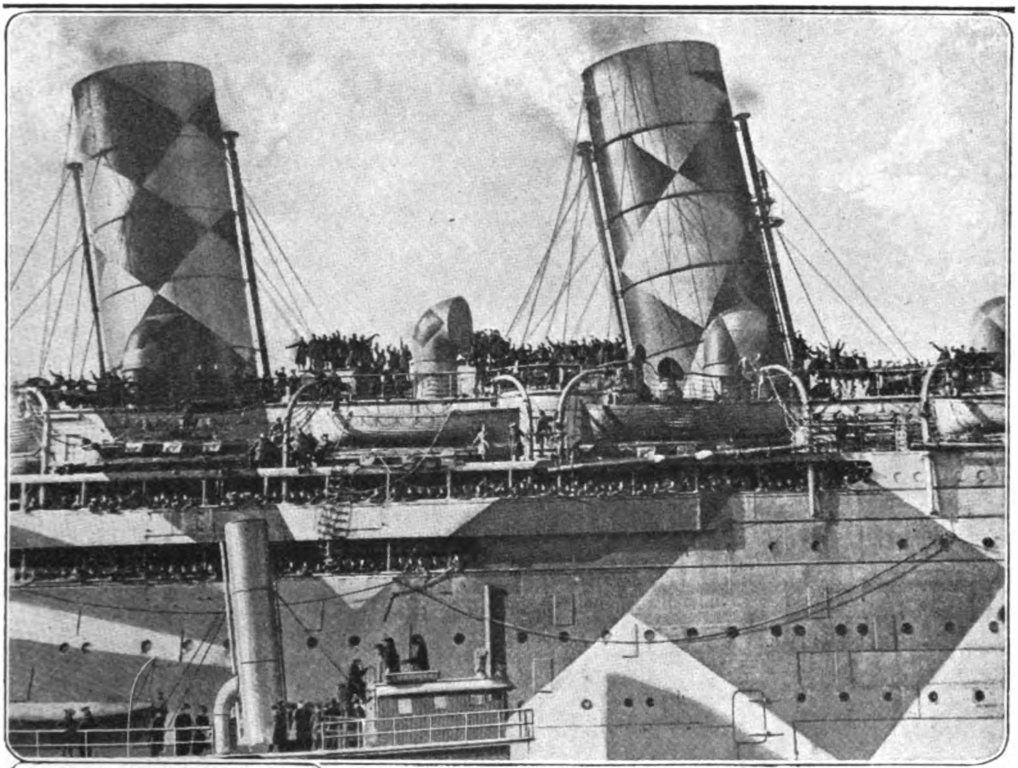
HOME-COMING SOLDIERS CHEER STATUE OF LIBERTY AS TRANSPORT STEAMS INTO HARBOR

As the "Mauretania" Steamed up the Harbor, Its Decks were Packed with Uniformed Men, Who Silently Watched the Shore Line Until the Goddess of Liberty Was Abeam. From Stem to Stern a Great Cheer Arose and Caps were Waved in Salute. The Photograph Reproduced Above was Taken at the Memorable Moment When the Returning Soldiers Thus Paid Homage to Their Native Land's Emblem of Freedom. After Disembarking, the Troops were Taken by Ferry to Long Island City, and from There to Camp Mills

"MAURETANIA" BRINGS FIRST TROOPS FROM EUROPE



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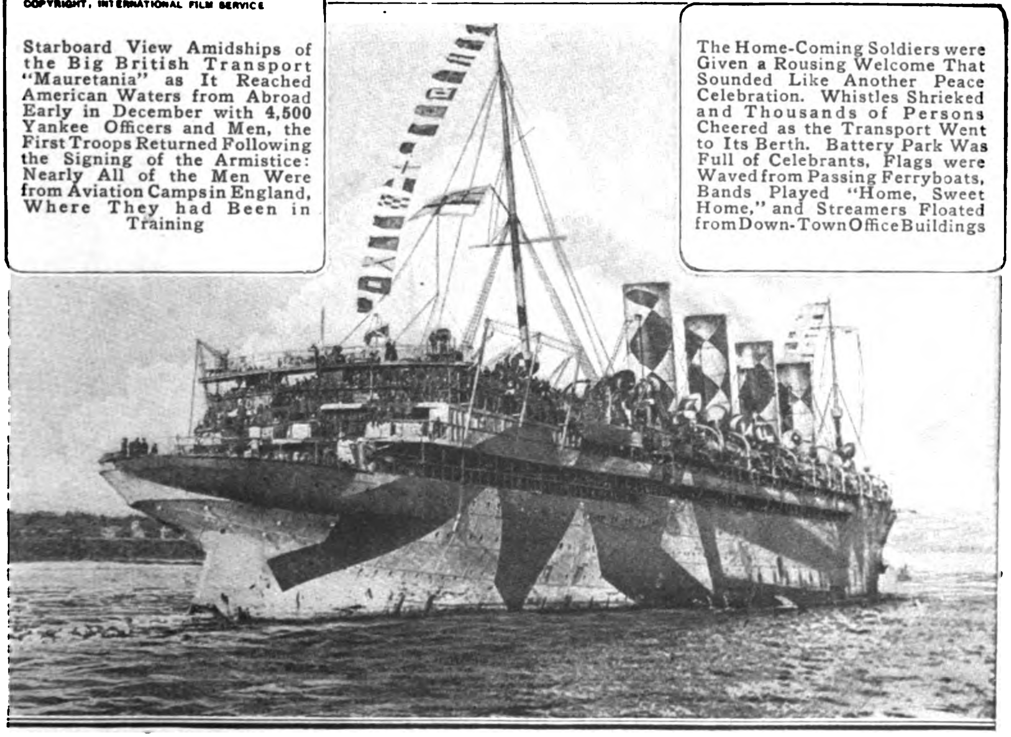
Starboard View Amidships of the Big British Transport "Mauretania" as It Reached American Waters from Abroad Early in December with 4,500 Yankee Officers and Men, the First Troops Returned Following the Signing of the Armistice: Nearly All of the Men Were from Aviation Camps in England, Where They had Been in Training



The Home-Coming Soldiers were Given a Rousing Welcome That Sounded Like Another Peace Celebration. Whistles Shrieked and Thousands of Persons Cheered as the Transport Went to Its Berth. Battery Park Was Full of Celebrants, Flags were Waved from Passing Ferryboats, Bands Played "Home, Sweet Home," and Streamers Floated from Down-Town Office Buildings

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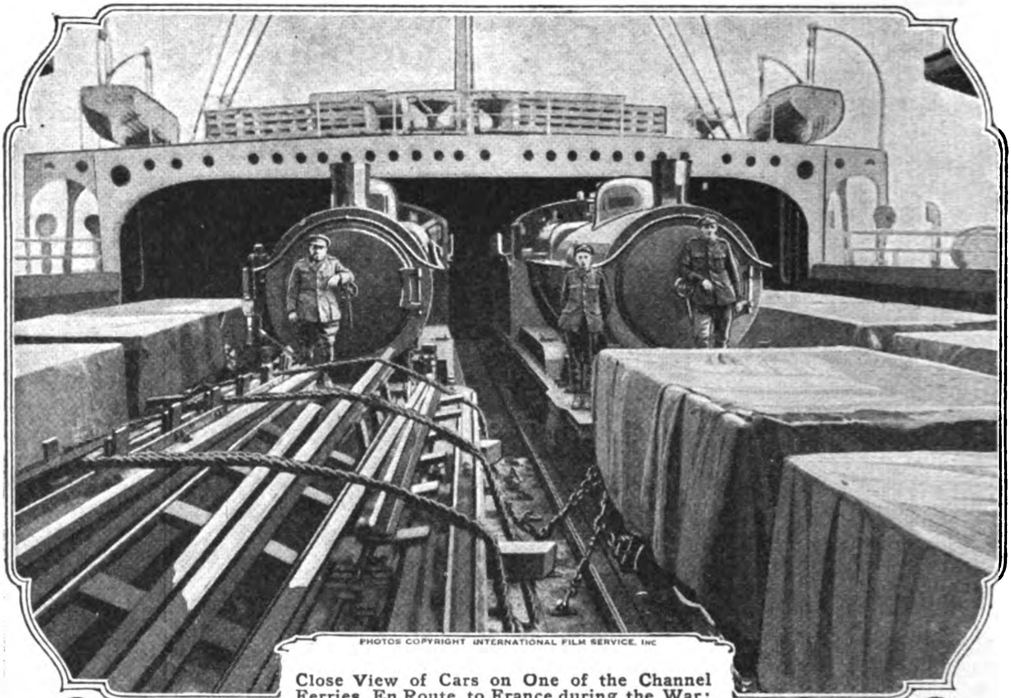
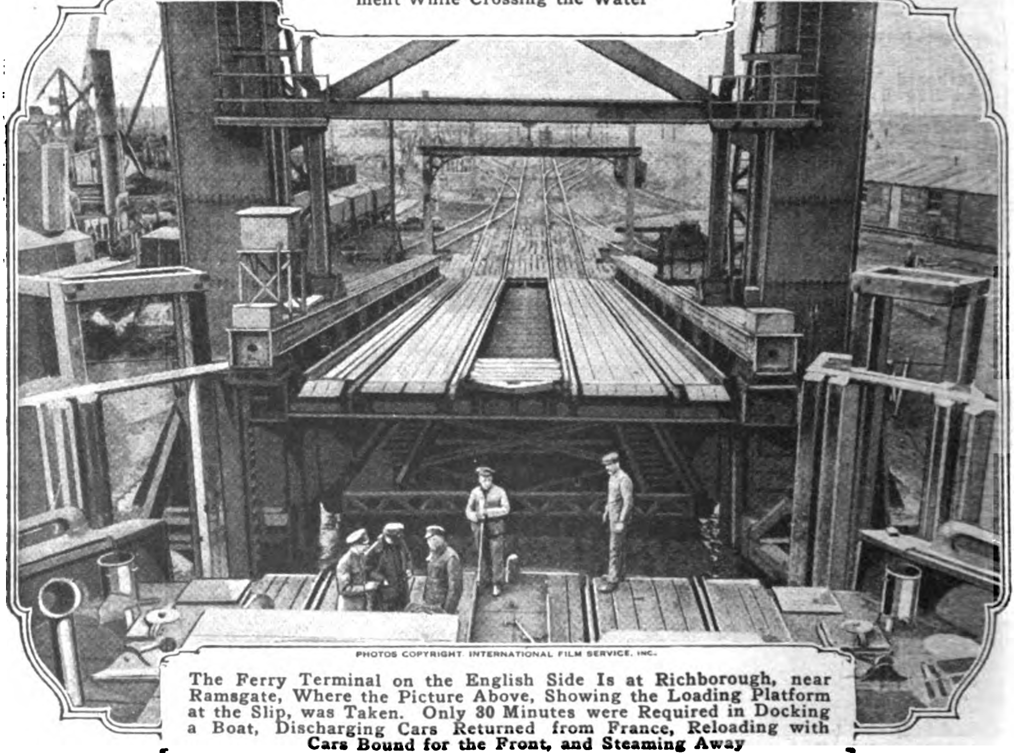
CAR FERRIES PERMITTED ENGLAND TO SHIP WAR



PHOTOS COPYRIGHT INTERNATIONAL FILM SERVICE, INC.

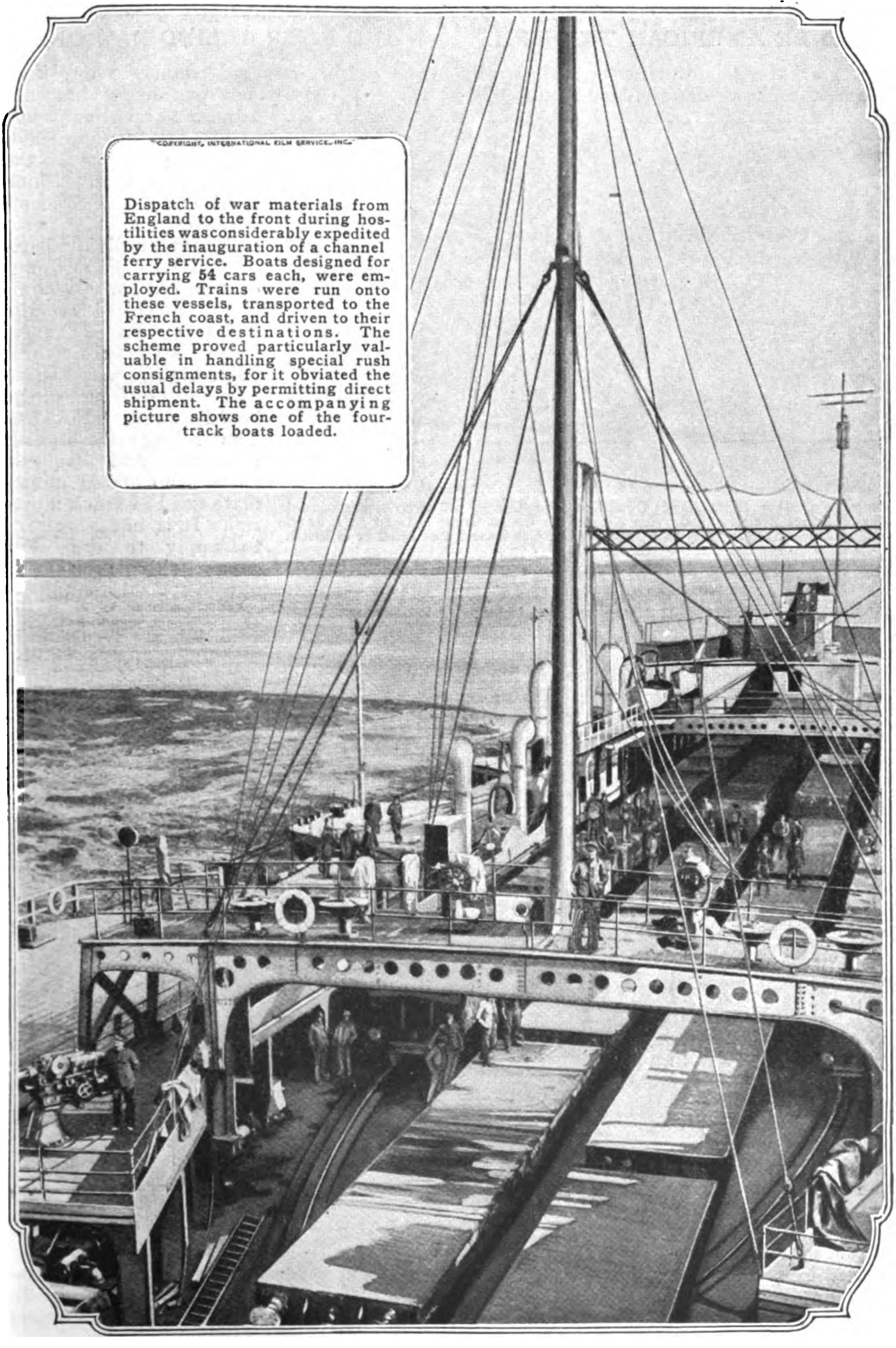
Close View of Cars on One of the Channel Ferries En Route to France during the War: **A Glance between the Two Trains Shows How the Cars are Anchored against Movement While Crossing the Water**



PHOTOS COPYRIGHT INTERNATIONAL FILM SERVICE, INC.

The Ferry Terminal on the English Side Is at Richborough, near Ramsgate, Where the Picture Above, Showing the Loading Platform at the Slip, was Taken. Only 30 Minutes were Required in Docking a Boat, Discharging Cars Returned from France, Reloading with **Cars Bound for the Front, and Steaming Away**

SUPPLIES ABROAD WITHOUT RELOADING AT PORTS



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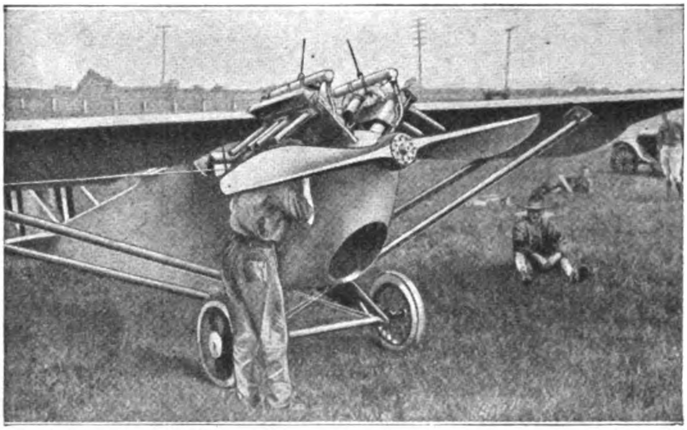
Dispatch of war materials from England to the front during hostilities was considerably expedited by the inauguration of a channel ferry service. Boats designed for carrying 54 cars each, were employed. Trains were run onto these vessels, transported to the French coast, and driven to their respective destinations. The scheme proved particularly valuable in handling special rush consignments, for it obviated the usual delays by permitting direct shipment. The accompanying picture shows one of the four-track boats loaded.

TEST FLIGHT SHOWS NEW PLANE TO BE AMERICAN TRIUMPH



America's New Monoplane Occupies the Center of the International Aeronautical Stage. It Carries Almost Twice as Great a Load as a Spad or Sopwith Single Seater, and Climbs and Flies Faster Than Either of Them

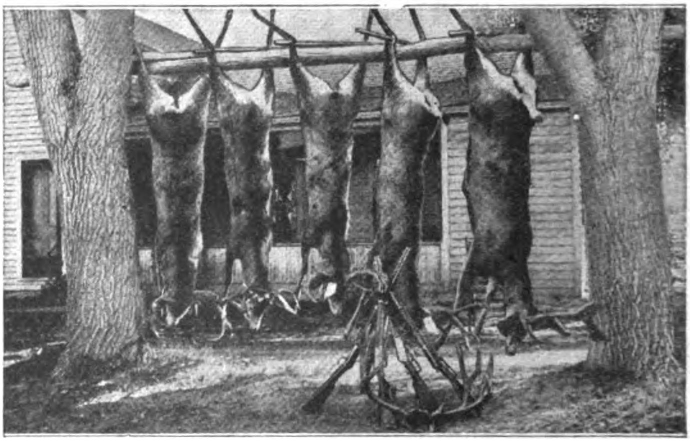
Remarkable performance was shown by a new American-designed and built two-seater monoplane that was put through its trials at Dayton, Ohio, recently. Carrying two persons and full military equipment, including four machine guns and 2,000 rounds of ammunition, it developed the record speed of 145 miles an hour. Also, it reached an altitude of 25,000 ft. Of further significance is the fact that it climbed 10,000 ft. in eight minutes. In accomplishing these feats, it showed its superiority over existing European single seaters. The monoplane is of 32-ft. span and 7-ft. chord. It weighs only 1,300 lb., and because of this, is said to be able to carry a live load almost as great. It mounts a 300-hp. American-built Hispano-Suiza motor that gives it a speed range of more than 100 miles an hour. Obviously this means an unusually low landing speed, a most valuable asset. The design of the plane is noticeably original. It has only one-tenth as many parts as the average European single seater. All wire stays have been eliminated, and the wings are braced by metal struts. For the first time a monoplane with the strength of a biplane has been constructed.

NEW RULING AIDS EXPORTERS AND FOUR ALLIED NATIONS

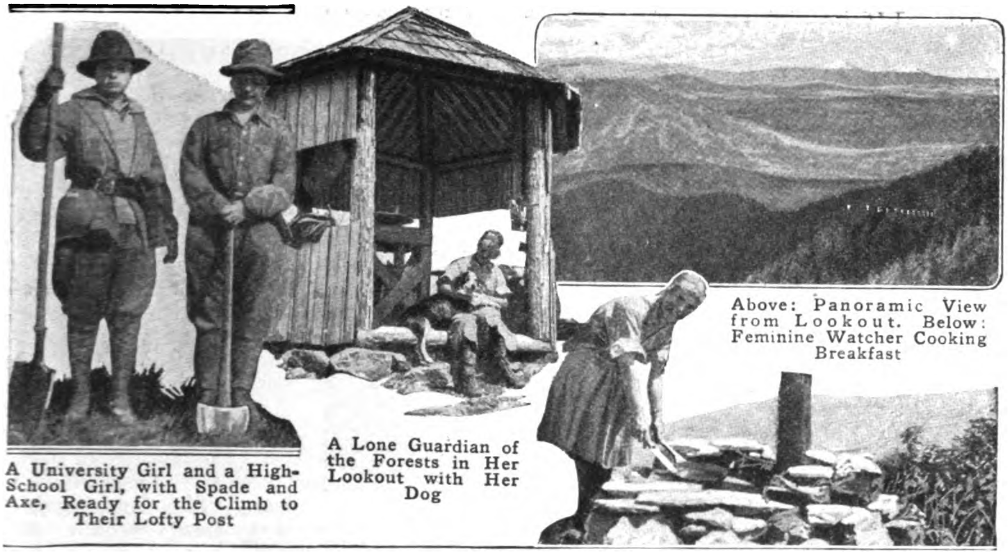
Exporters in this country have been relieved of a great amount of hampering routing, as well as not infrequent delays, by a new ruling of the War Trade Board which went into effect December 16 last. This provides that individual export licenses are no longer required for any commodity destined for the United Kingdom, France, Italy, or Japan, or their possessions, except those commodities found in the board's conservation list. The ruling will benefit producers and also our allies, who are in immediate need of much material. It is not necessary to apply to the War Trade Board to make shipments under the new ruling, and no special documents from the board are needed. It is stipulated, however, that on the package or export declaration should appear certain information, including a list of contents.

BRIEF OPEN SEASON FOR DEER ENJOYED BY THOUSANDS

Colorado had its first open season for deer since 1913 last fall and it lasted but three days, yet for that brief period approximately 17,000 persons took out licenses, showing their fondness for deer



Five of the Hundreds of Deer Which Hunters Killed in Colorado during a Three-Day Hunting Season—the First in Five Years



A University Girl and a High-School Girl, with Spade and Axe, Ready for the Climb to Their Lofty Post

A Lone Guardian of the Forests in Her Lookout with Her Dog

Above: Panoramic View from Lookout. Below: Feminine Watcher Cooking Breakfast

hunting by spending thousands of dollars on guns, ammunition, transportation, etc. Many days before the season opened the supply of licenses was exhausted. The number of animals shot by these sportsmen is estimated at 500. Calculating each hunter's expense for three days at $50, it seems safe to say that the venison from no other equal number of deer ever proved so expensive.

BEST RADIO APPARATUS KNOWN ON PRESIDENT'S SHIP

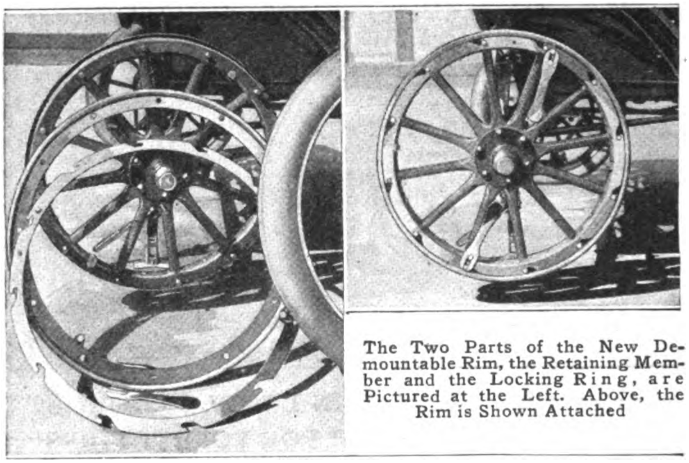
The most modern radio apparatus known was provided to keep President Wilson in touch with Washington and the rest of the world while crossing the Atlantic. The battleship "Pennsylvania," one of the fleet accompanying the president's boat, the "George Washington," was equipped with the most powerful transmitting set on any American naval ship. Both the "George Washington" and the big battleship had apparatus for receiving messages from high-power stations. Radio telephones and low-power radio sets were utilized when one ship communicated with the other. Messages from the president were relayed to the "Pennsylvania," which sent them to three radio stations located at various points in the East. Each of these stations transmitted the messages to an office in the Navy Department, where comparisons of text were made before delivery to the persons addressed. All messages to the president passed through this same office.

WOMEN IN LONELY LOOKOUTS WATCH FOR FOREST FIRES

To the creditable list of occupations in which the war showed women to be efficient and faithful, may be added that of serving as observers in lookout posts on the peaks of western mountains and hills. From these lonely points of vantage watch is constantly kept for forest fires in the region roundabout. Because of the scarcity of available men during the war, this work was performed largely by women and girls, many of the latter being of high-school age who were glad of an opportunity to spend a summer vacation in the open. Usually the girls "manned" the posts in pairs, but in one instance a lone girl and her faithful dog were on duty. Whenever smoke was seen rising among the trees it was the task of the watcher to calculate the location of the fire by means of special apparatus provided for the purpose, and then communicate at once by telephone to the forest rangers, who would hurry out prepared to fight the flames.

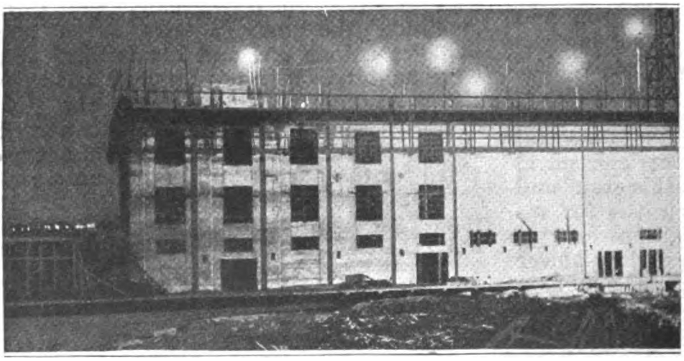
NOVEL LOCKING MEANS FOR DEMOUNTABLE RIM

Among the new quickly demountable rims that have been invented for a common light motor car, there is one of particularly unusual design. It consists of a retaining rim and locking ring. Spaced equidistantly about the circumference of the former is a series of holes that fit over pins in the felly. When the rim has been slipped in place, the locking rim, which is supplied with a sequence of open slots, is attached with the aid of a special wrench. It is asserted that with the rim in use, an eight-year-old boy has been able to remove and replace a tire in less than one minute.


The Two Parts of the New Demountable Rim, the Retaining Member and the Locking Ring, are Pictured at the Left. Above, the Rim is Shown Attached

WORK ON KANSAS FLOUR MILL NIGHT AND DAY

Realizing that there will be a great demand for food, particularly flour, for European nations during many months to come, the builders of a concrete flour mill at Hutchinson, Kan., the center of the wheat belt, exerted every effort to complete their work as soon as possible. The walls rose higher by night as well as by day, the work at night being done with the aid of twenty-five 500-watt tungsten lights.

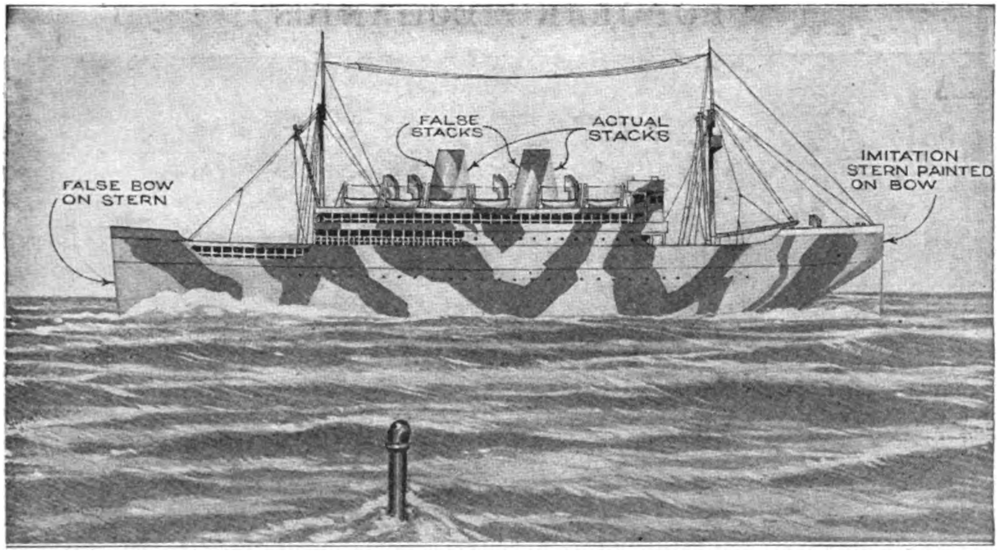

Night View of Flour Mill under Construction at Hutchinson, Kansas: Twenty-Five 500-Watt Tungsten Lights Made Night Work Possible, So That the Structure was Completed in Quick Time

SOUTHERN STATES REJOICE AT VICTORY OVER TICKS

A good portion of the South is this winter rejoicing at the big advance which the government has made in eradicating the cattle-fever tick from its territory. A campaign has been on since 1906, and each year the quarantine has been lifted from considerable territory in which the inspectors have been at work, but last year the best record of all was made, more than 79,000 square miles having been officially declared "tickless," December 1, last. The fight against this pest, which has caused an annual loss of $40,000,000 by reason of its attacks on the live stock of the South, consists in dipping all cattle in a community at regular intervals in an arsenical solution. Last year's endeavors bring the total area freed of the pest up to 458,000 square miles, or 63 per cent of the entire region which was put under quarantine 12 years ago.

NOISES OF AEROPLANE MOTORS AND BOMBS IN MUSIC

As might be expected, the war's influence is evincing itself in some of the program music of British composers that is now being produced. One of the selections rendered recently at a London concert was the cacophonic story of a Zeppelin raid. The audience, being painfully familiar with the theme, experienced no difficulty in interpreting the music. The droning of aeroplane motors, the muffled purring of Zeppelin engines, the staccato ripping of machine guns, and the bursting roar of bombs, all were developed realistically with snare drums, kettledrums, and large bass drums, aided by other instruments, which produced the human and colorful elements of the song.



A False Bow at the Stern, False Stack Lines, and Skillfully Deceptive Painting Make This Ship Appear to be Moving toward the Left instead of the Right, as Is Actually the Case. A Torpedo Fired at the Ship would Probably Harmlessly Cross Its Wake

MASTERPIECES OF NAVY CAMOUFLAGE

Ships Appear to Run Backward, Gunboats Look Like Yachts, Painted Destroyers Protect Leviathans

By LLOYD SEAMAN

WITH the lifting of the censorship curtain, camouflage on the high seas, as it was practiced throughout the war, comes for the first time into its own. Mystery, as deep and gray as sea fog, has hidden the tricks and systems of the navy camoufleurs. This was necessary because Germany herself did not know these marine arts. Her submarines could never establish contact strong enough to unravel the secrets of the ships that were made by paint and brush to disappear, to take strange forms, to sail backward, and to perform the weirdest tricks of legerdemain.

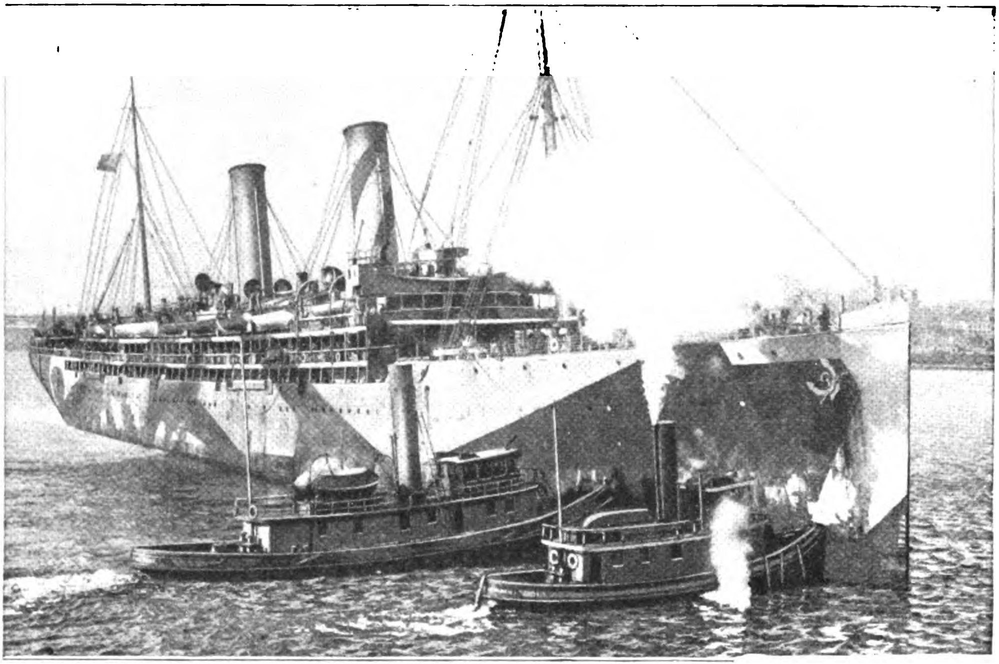
Long ago the public learned of camouflage on land, how towns and roads and trenches were "painted out"; how snipers masqueraded as trees; how batteries palmed themselves off as garbage heaps, etc. These fascinating army "stunts" of this newest of war arts were allowed to be told, because Germany knew them and in large part practiced them herself. The land opponents were in such intimate contact that neither could preserve secrets long from the other.

On the water, however, Germany was puzzled. And she never did fathom the plans and schemes of the navy camoufleurs. While the increasing inefficiency of the U-boats, as the war progressed, was, of course, largely due to the growing number of destroyers and seaplanes, full credit must be given the development of amazingly clever camouflage artifices.

For instance, it may now be told that scores of ships evaded torpedoes because, to the periscope eye, they were apparently steaming in one direction while actually progressing in the opposite way. This uncanny evolution was due wholly to brush and paint, and a few boards. It was accomplished by making the steamer's bow look like her stern, and her stern like her bow. At the rear, a steamer curves in below the deck line down to the water line. At her bow, she drops in a straight, sharp line from nose to the waves. So the camoufleurs nailed a scaffolding, sharp and straight, over her stern, painted upon it white waves breaking as from the slicing impact of a prow, and then proceeding to the real bow, painted upon either side a heavy curving line that swung inward below the deck line. Sea-color paint and broken lines of darker hues made the lower half of the bow line invisible.

The smokestacks, which always slant aft, were with paint and boards made to slant forward; that is, the real lines of the stacks were painted out and false lines and false angles substituted. Smoke consumers prevented the telltale clouds from giving the whole reversal policy away to the U-boats.

A periscope, cutting the surface for two



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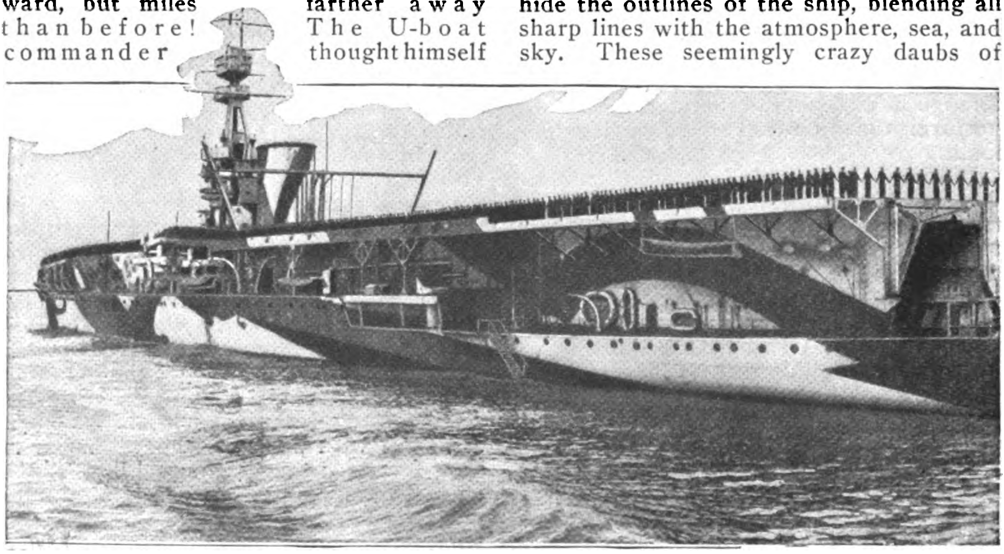
The "Balmoral Castle," the British Vessel That Took a Leading Part in Blocking Zeebrugge Harbor: She Steamed into New York Recently, Still Wearing Her Confusing Camouflage Armor

seconds, then submerging to "plop" up again for another peep, saw this steamer clearly, noted her apparent direction, and dived hastily to intercept her. When in a position advantageous for murder, the submersible rose. Lo and behold, the steamer was far astern, still steaming forward, but miles farther away than before! The U-boat commander thought himself drunk or crazy, and either gave up or made a desperate attempt to reach the steamer that was now too far away to catch. This subterfuge was the logical outcome of the first methods, which were simpler, consisting mainly of fundamental color studies, broken lines, calculated to hide the outlines of the ship, blending all sharp lines with the atmosphere, sea, and sky. These seemingly crazy daubs of



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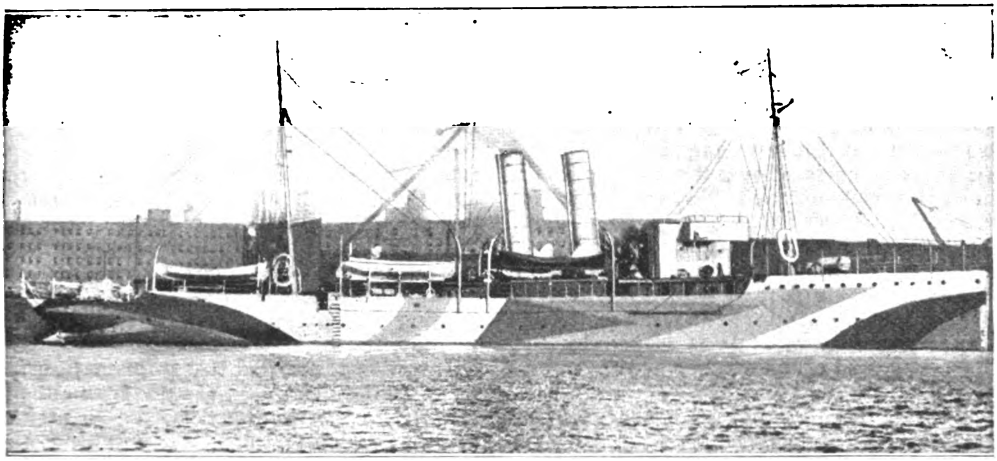
The British Aerodrome Ship "Furious," with Her Crew Lined Up for a Review: The Vessel's Broad Length would have Been an Admirable Torpedo Target, Were It Not for the Curves of Her Camouflage, Which Sometimes Caused Her to Look Like Several Ships, Bow On

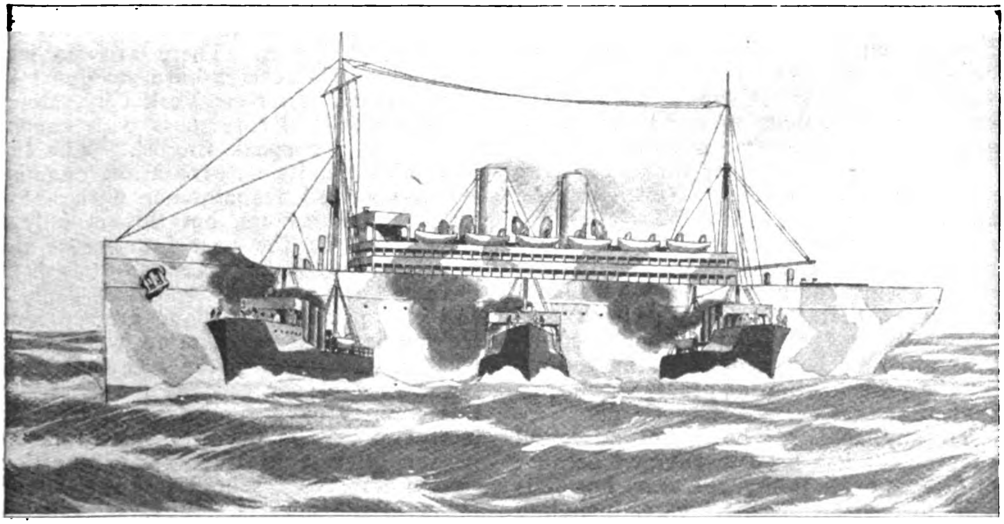


How the Old "Eastland" Atoned for the Disaster in the Chicago River in the Summer of 1916: She Is Now the Biggest and Fastest Gunboat of the American Navy. Her Camouflage Coat, Which Gave Her, from a Distance, the Lines of a Yacht, Afforded Her Effective Protection

paint served to blur the U-boat gunners' eyes. Gradually, better and more definite methods were worked out. Soon great liners put out to sea so camouflaged that at a distance they appeared to be small white yachts. Upon their sides, forward or aft, white paint was so placed that it drew the eye, while the vaster outlines above and behind it were concealed in neutral lines.

From this developed the still more effective system of painting destroyers on each side of the steamer—black realistic pictures of the small vessels drawn against the white flanks of the great ships. Smoke would be painted issuing from the destroyer's stacks, waves breaking at her prow, and guns looming fore and aft. What U-boat commander, peeping hastily, would not submerge and depart, for the destroyers meant death? A greater means of terrorizing submarines next appeared. Two or three destroyers were painted on the steamer's sides, with their noses pointed at right angles to the length of the steamer. When a periscope snatched a hasty glance, it saw these sea terriers bearing down right upon it.

This scheme worked especially well where the steamer bearing the picture protectors was in the same part of the sea with steamers surrounded with actual destroyers, and it served to free the real destroyers for more aggressive work.



The Masterpiece of Navy Camouflage: Destroyers are Painted upon the Sides of the Ocean Leviathans. No Hun Submarine Commander Cared to Face the Redoubtable Destroyers with Their Deadly Depth Bombs. Ordinarily, No Time was Spent in Investigation — the U-Boats Dived and Fled the Spot

GENEROUS AID OFFERED TO DISCHARGED MEN

That more generous and intelligent provision has been made for the American soldiers and sailors who fought in this war than for those engaged in any previous conflict is shown by the contents of a booklet entitled "When You Get Home," a copy of which is given to each discharged man. It contains facts which every man who wears, or has worn, a uniform should know regarding arrears in pay, legal matters, insurance, vocational training, etc. It is issued by the department of civilian relief of the American Red Cross.

If a soldier, on being discharged, receives what he believes is less than his full pay, the Home Service Section of the Red Cross stands ready to help him, making it unnecessary to hire an attorney or claim agent. With the assistance of local committees of lawyers, it is also ready to give legal advice free on other matters, to those who cannot afford to pay for it.

It is to a soldier's and sailor's advantage to know that if a court has rendered judgment against him by default, either while in the army or within 30 days after his discharge, he still has his chance in court if he applies in person, or through an attorney, within 90 days after his discharge. If payments by a soldier on a mortgage on property have become overdue while he was in the army, the Civil Relief Act forbids the selling of the property to meet the obligation, except by special court order, until three months after a soldier has been discharged. This applies only to a mortgage executed before March 8, 1918, on property owned before joining the army. Special provision of a somewhat similar character is made for the soldier whose taxes or assessments have become overdue.

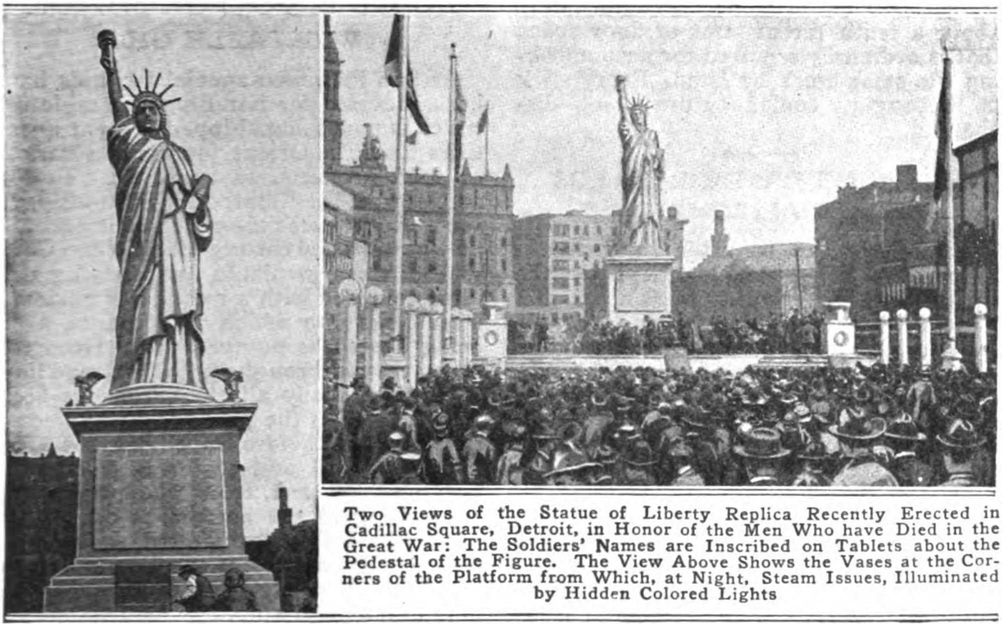
If a man in the service took advantage of a provision in the Civil Relief Act and applied to the Bureau of War Risk Insurance to protect his private insurance policy or fraternal-benefit membership from lapsing for nonpayment, he should remember that he must pay back premiums, with agreed interest, within one year after discharge, or if discharged after the proclamation of peace, within one year after that event.

To any soldier who wears a wound chevron, or has been discharged because of disease or disability, the army hospitals will give special medical care, including treatment designed to restore his health and improve his chances of success in a chosen line of work. Men who have lost an arm or a leg are entitled to receive free, first a temporary, and then a permanent, artificial limb of the most modern type. This will be repaired and replaced as needed, without charge. If a man is permanently disabled, the government will pay for the rest of his life a disability compensation which will not be reduced, no matter how successful he may be in overcoming his handicap and increasing his income.

If a man is entitled to compensation for even partial disability, the government offers him free training designed to fit him for a good job, and while taking the training, he is guaranteed a total income from all sources of at least $65 a month. The taking of this training is optional with the individual, but it is strongly recommended by the Red Cross. In addition to advice on legal matters, as indicated above, the Home Service Section stands ready to aid the soldiers and their families in many other ways, which only help to prove that the Red Cross is "the greatest mother in the world." The government is also making extensive plans designed to aid the soldiers in quickly returning to complete economic independence.

AMERICANIZING FOREIGNERS A GREAT PATRIOTIC TASK

To the Bureau of Naturalization, of the Department of Labor, has been assigned the big task of leadership in Americanizing the foreign elements in the United States. There are no less than 17,500,000 foreign-born residents in this country. In New York City, alone, there are 500,000 foreigners who cannot read, write, or speak English. The bureau, through its naturalization examiners, has gained acquaintance with about 3,000,000 immigrants, but this is only a beginning. In the past four years the public schools in 2,000 communities have furthered the work by teaching English and the principles of our government. How much real assimilation remains to be done is shown by the fact that, thus far, only two per cent of the aliens in this country have applied for citizenship instruction. The bureau aims to foster keener interest in this great question among employers, school authorities, and the public in general. Wisely conducted classes in factories and schools are a principal means of forwarding the work.



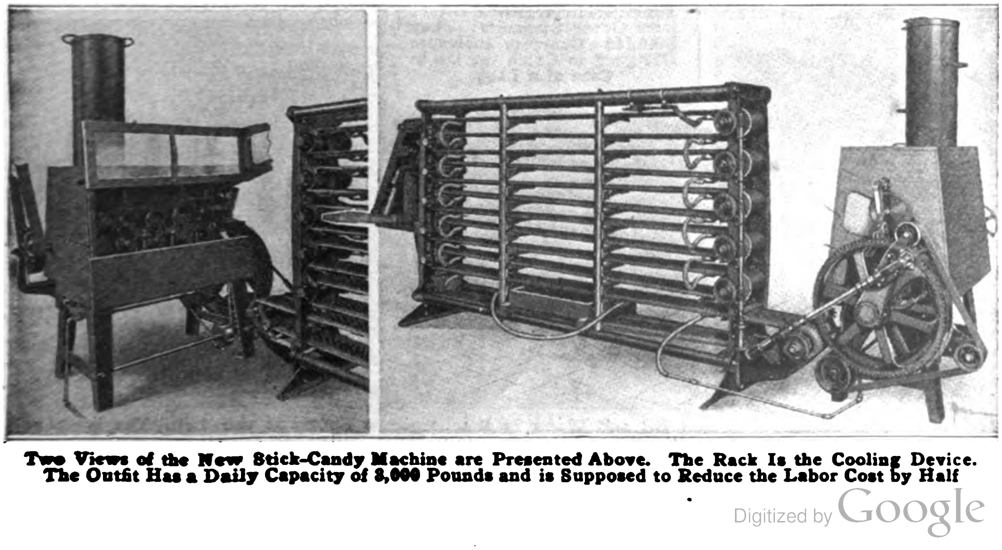
Two Views of the Statue of Liberty Replica Recently Erected in Cadillac Square, Detroit, in Honor of the Men Who have Died in the Great War: The Soldiers' Names are Inscribed on Tablets about the Pedestal of the Figure. The View Above Shows the Vases at the Corners of the Platform from Which, at Night, Steam Issues, Illuminated by Hidden Colored Lights

STATUE OF LIBERTY FEATURE OF DETROIT'S HONOR ROLL

Of the many memorials erected in honor of the men who have died in the war, none is more appropriate than that recently dedicated in Detroit, the central feature of which is a replica of the Statue of Liberty. On the pedestal of the white figure, which rises above a large outdoor rostrum, are inscribed the names of Detroit's heroes. At each corner of the platform are ornamental vases containing colored lights. At night steam is made to issue from pipes, also concealed in the vases and in Liberty's torch, and as the vapor takes on the hue of the lamps, the effect produced is very striking.

NEW STICK-CANDY APPARATUS HAS LARGE CAPACITY

Broad claims are made for the efficiency of a new stick-candy making machine that has a daily capacity of 3,000 lb. The apparatus is supposed to effect a 50 per cent reduction in labor costs, in addition to producing candy that is of superior appearance, and of uniform size, shape, and



Two Views of the New Stick-Candy Machine are Presented Above. The Rack Is the Cooling Device. The Outfit Has a Daily Capacity of 3,000 Pounds and is Supposed to Reduce the Labor Cost by Half

weight. The machine occupies only about a tenth the amount of floor space that is ordinarily required for accomplishing the same work by hand. Every stick is thoroughly cooled before being discharged.

THRIVING DATE ORCHARDS IN ARIZONA

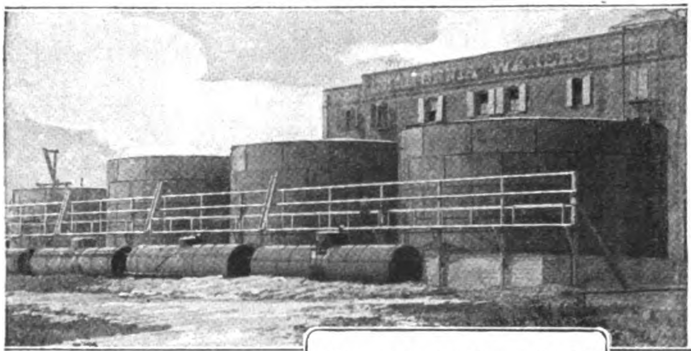
That dates can be made to thrive in Arizona is being demonstrated by the agricultural experiment station of the University of Arizona, whose orchards contain 508 trees, representing 125 different varieties. The fruit is ripened artificially and marketed in the East. Alkaline soil and the available water of the region appear to be well suited to the needs of the date trees, which, it is declared, will bear fruit for 100 years.

¶It was found recently that bars of pure silver, heated to a certain temperature and left for a time in a strong magnetic field, become weakly but permanently magnetized.

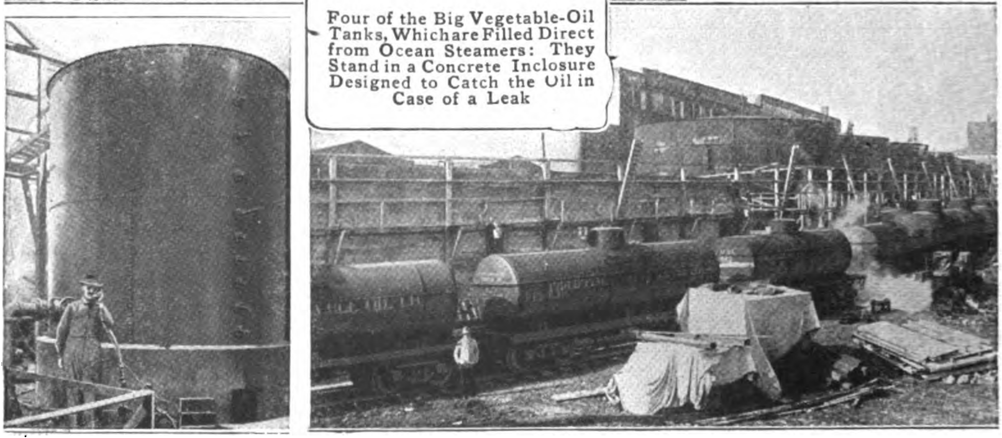
MODEL PLANT FOR STORING VEGETABLE OIL

At San Francisco special facilities have been provided for handling vegetable oil, which is now being shipped in great quantities from the Orient for use in a variety of food products, in soap, etc. In the past year, it is estimated, 200,000 to 250,000 tons of this material—much of it coconut oil—have passed through the Golden Gate. One of the new plants for receiving this oil is equipped with a number of immense steel tanks into which the product, after being heated, is pumped direct from the ocean vessels through an 1,800-ft. pipe line. When practically all the cargo has been forced through the pipe, water is injected to clean it out before the oil hardens. The mixture of oil and water is discharged into a special tank, from which the water, on settling to the bottom, is drawn off, while the oil is transferred to another tank. A special telephone line enables a watcher to notify the ship when the pumping should stop.

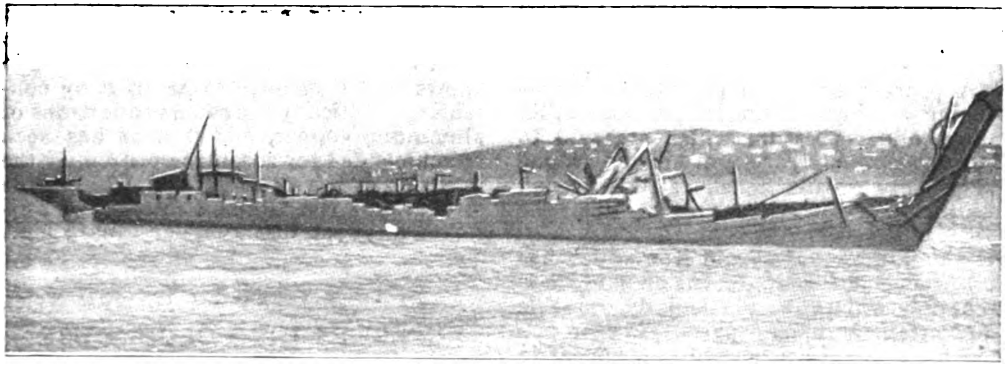
In each of the storage tanks are 1,900 ft. of steam-pipe coils with which the oil is heated to a fluid consistency, preparatory to pumping it into tank cars for transcontinental shipment. The warmed oil is pumped into a 4-in. main, from which it flows by gravity into the cars, as many as 15 being filled at one time. These cars resemble those used to carry petroleum.



Four of the Big Vegetable-Oil Tanks, Which are Filled Direct from Ocean Steamers: They Stand in a Concrete Inclosure Designed to Catch the Oil in Case of a Leak



The Tank into Which the Mixed Oil and Water is Discharged is Shown at the Left. The Watcher is Telephoning to the Ship. At the Right, Tank Cars are being Filled for Transcontinental Shipment. The Escaping Steam Is from Pipes Used to Heat the Oil to Keep It in a Fluid State for Loading



Charred Hull, Which Is All That was Left of the $110,000 Auxiliary Schooner "Dornfontein," Launched Only a Few Weeks Before It was Torpedoed and Set on Fire by the Germans: In the Condition Shown Here It was Purchased for $5,500

CHARRED HULL OF SCHOONER BOUGHT FOR SMALL SUM

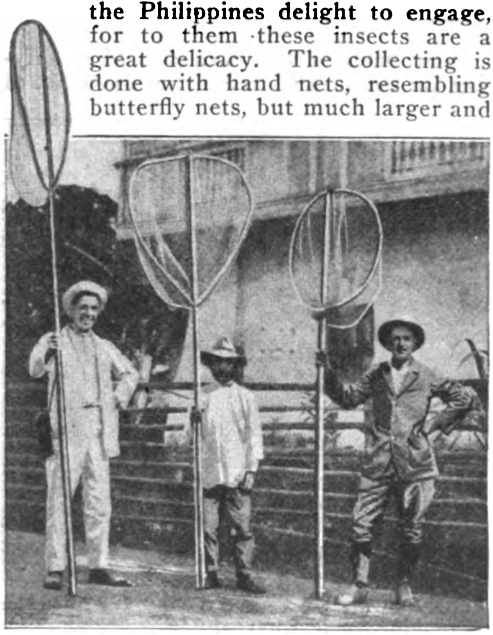
A fine auxiliary schooner, speedily overtaken by war's destruction after its launching at St. John, N. B., was the "Dornfontein," a four-masted vessel, 185 ft. long, which cost $110,000. A few weeks ago it was towed into a Maine port—a charred hull which had been purchased for $5,500. The vessel was launched early in June, and three weeks later, while on its maiden voyage to Africa with 900,000 ft. of lumber, was torpedoed by a U-boat in the Bay of Fundy. The enemy, after removing all valuable supplies, set fire to it. Half of the cargo was consumed and the craft burned to the water's edge. The vessel is being rebuilt and should be ready for rechristening and relaunching early in the summer.

BAGDAD RAILWAY IN POOR CONDITION

The allies, particularly the British, have been much interested in learning something of the condition of that portion of the Berlin-to-Bagdad Railway which lies in Asia Minor. Information obtained since the signing of the armistice shows that the tunnels through the Taurus Mountains, in southern Asia Minor, were opened to broad-gauge traffic last October, and that trains can now run to Neisibin, a point about 100 miles west of Mosul, in Mesopotamia. These tunnels, it is interesting to note, presented unusual difficulties to those constructing them and require inspection daily. While the track for the most part is said to be in good condition, the rolling stock, particularly the engines, was badly in need of repair long before hostilities ceased. Another factor contributing to irregularity of service, even on the western portion of the line, was shortage of coal. It is thought the allies could not build the necessary track and run trains to the Persian Gulf in less than two years.

LOCUST CATCHING A TASK FILIPINOS ENJOY

At a certain season of the year locust catching is a task in which the natives of the Philippines delight to engage, for to them these insects are a great delicacy. The collecting is done with hand nets, resembling butterfly nets, but much larger and having handles, in some cases 10 ft. long. With the return of the locust catchers to town a great fiesta, or feast, is held, at which the insects are eaten.



Men in the Philippines Equipped with Nets for Catching Locusts, Which are Collected in Great Quantities by the Natives during the "Locust Season," and Eaten as a Delicacy

PATENTED PROCESS OF MAKING CASTINGS UNDER PRESSURE

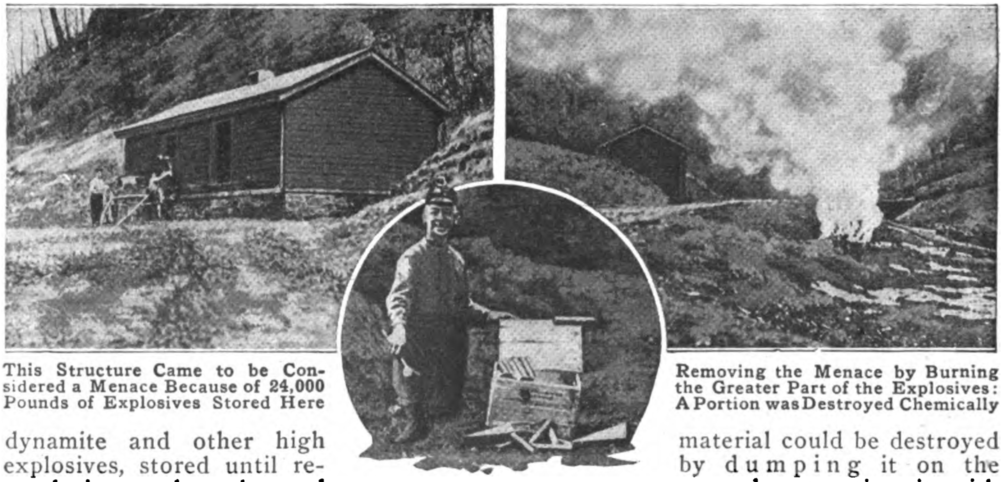
A process has been patented for producing castings of nonferrous and other alloys under pressure which are said to be more dense, freer from blowholes, and to possess greater tensile strength than castings made in sand. One result of the process has been the making of an alloy of aluminum, copper, and iron which has a low coefficient of expansion and, it is believed, will prove particularly valuable for certain aeroplane parts. Larger pistons than any yet produced now appear to be a possibility. By the new method the molten alloys are poured into metal molds and the castings are formed or congealed under pressure. They are described as being, in reality, die castings formed under high pressure. Their structure, it is said, is made up of unusually fine crystals and the material possesses exceptional machining qualities. An automatic machine has been built which turns out several hundred castings per hour.

With reference to the making of castings for aeroplane machinery it is interesting to note that analysis of metal taken from a captured Zeppelin some time ago shows that substance to be an alloy containing practically the same proportions of aluminum, copper, and iron as has been recommended for aeroplane pistons by the inventor of the new process. The tensile strength of the German metal was estimated at about 40,000 lb. per square inch.

SEAPLANE, LOST IN DENSE FOG, CRASHES INTO CLUBHOUSE

During a recent flight from Baltimore toward Hampton Roads, the pilot of one of the largest flying boats in use by the navy lost his way on account of dense mist and fog, and was compelled to descend near Norfolk, Va., to learn his whereabouts. On starting to ascend a little later, the big machine crashed into a clubhouse near by which, apparently, the fog had hidden completely from view. Two of the five men in the plane were killed and two injured.

BURNING TONS OF DYNAMITE AN UNPOPULAR TASK



This Structure Came to be Considered a Menace Because of 24,000 Pounds of Explosives Stored Here

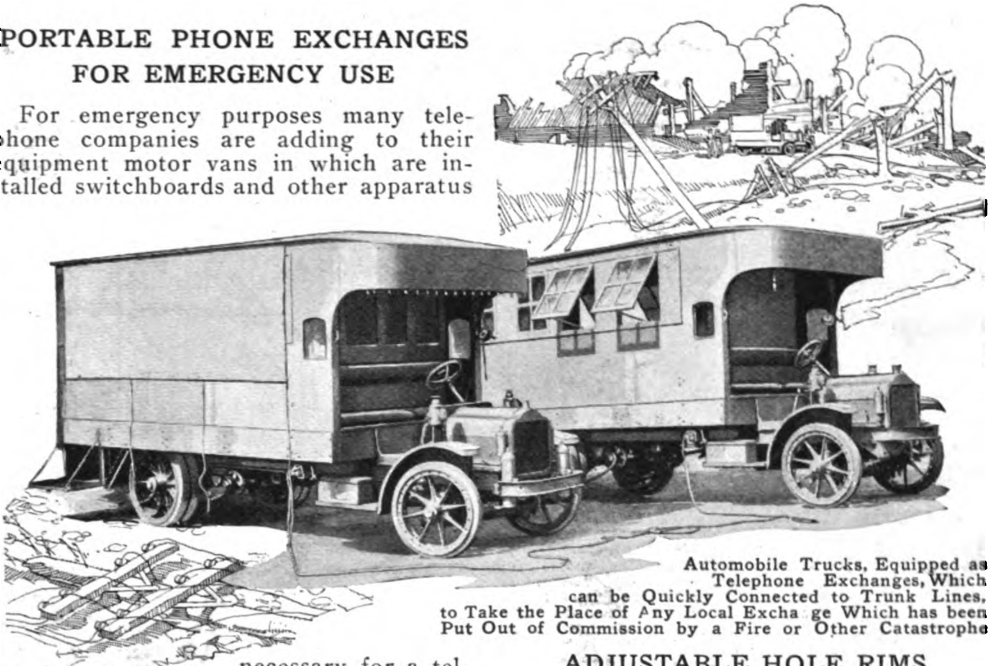
It's All in Knowing How. This Expert, with Wooden Mallet and Wedge, Was Not Afraid to Open the Dynamite Boxes

Removing the Menace by Burning the Greater Part of the Explosives: A Portion was Destroyed Chemically

Few persons were desirous of qualifying for the task of destroying 24,000 lb. of dynamite and other high explosives, stored until recently in an abandoned magazine near Sharpsburg, Pa. The unpopularity of the job was increased by the fact that a previous attempt to burn the explosive had resulted in detonations so violent that the experimenters fled. Finally an expert was employed who carefully opened each box with a wooden wedge and mallet and examined the contents. In most cases he found that the material could be destroyed by dumping it on the ground, saturating it with oil, and then lighting it with a fuse that permitted withdrawal before explosions took place. In other cases the dynamite was so badly decomposed that burning was not advisable, and chemical treatment had to be used in order to dispose of it.

PORTABLE PHONE EXCHANGES FOR EMERGENCY USE

For emergency purposes many telephone companies are adding to their equipment motor vans in which are installed switchboards and other apparatus necessary for a telephone exchange equal to the needs of a community of 25,000. When a fire, or other catastrophe, puts a local exchange out of commission, one or more of these trucks is rushed to the scene and telephone service is quickly restored, it being only necessary to connect up with the trunk lines. In cases where a fire has destroyed an entire town, outfits of this character have been invaluable in putting the distressed community in touch with the outside world. Portable exchanges in use in France are said to have suggested the idea to American telephone engineers.



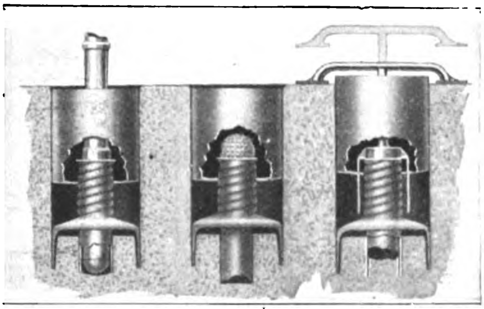
Automobile Trucks, Equipped as Telephone Exchanges, Which can be Quickly Connected to Trunk Lines, to Take the Place of Any Local Exchange Which has been Put Out of Commission by a Fire or Other Catastrophe

SERIOUS CORN PEST APPEARS IN EASTERN STATE

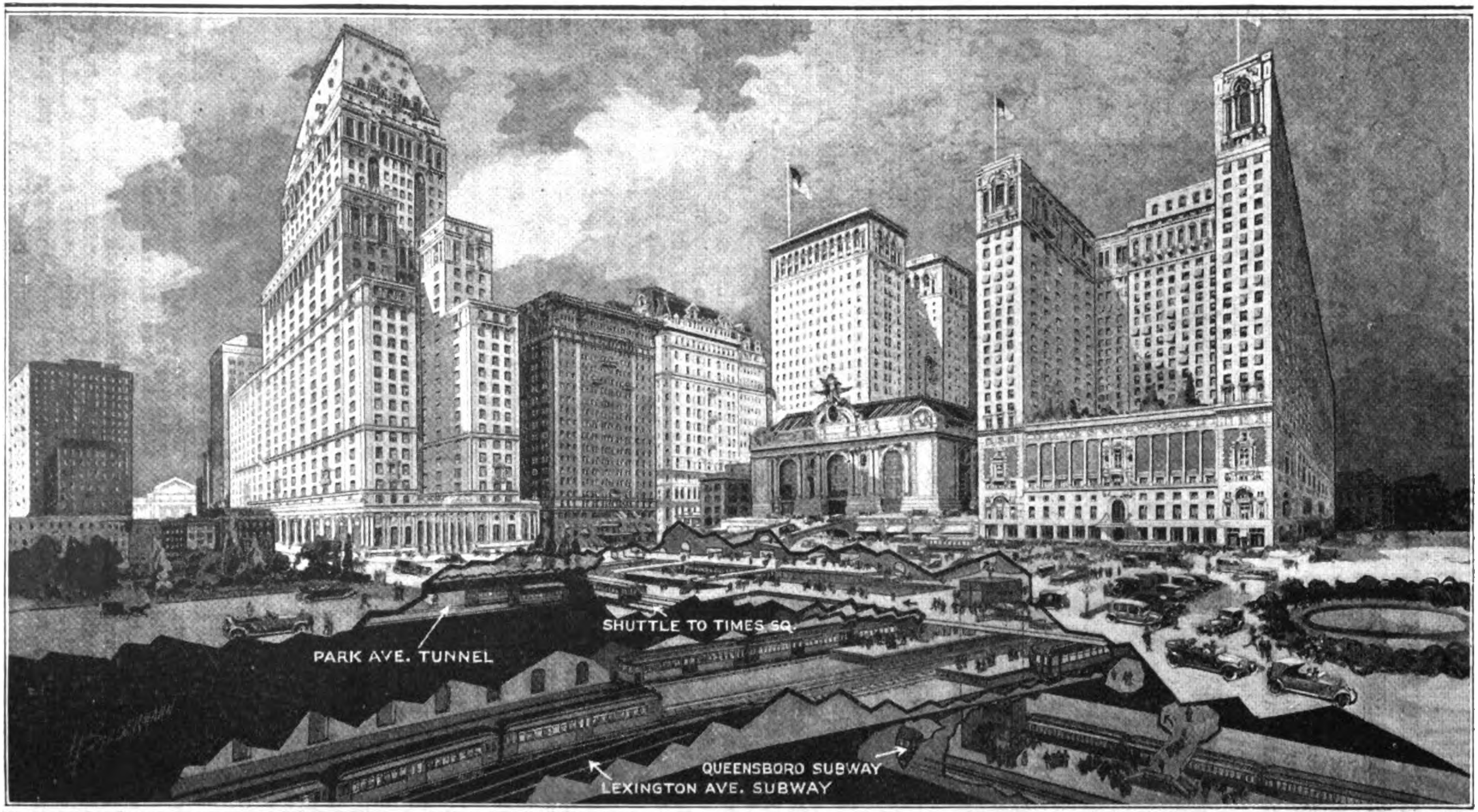
Because of a pest which has appeared in the corn in a certain section of eastern Massachusetts, the secretary of agriculture has placed that region under quarantine, forbidding the interstate shipment of cornstalks, corn on the cob, corn fodder, etc., from the section, if it is infected. The pest is known as the European corn borer, and is regarded as more to be dreaded than the army worm. It is described as a slender, dirty-white or pinkish, naked caterpillar which burrows into the stalks. The only practical way of destroying these creatures is said to be by burning the cornstalks, garden vegetables, grass, etc., where they seek refuge in the fall.

ADJUSTABLE HOLE RIMS FOR GOLF COURSES

A pressed-steel hole rim for golf courses is so designed that it keeps the balls from falling into mud that may accumulate at the bottom, and can be readily adjusted to the desired height by turning a removable key, furnished with the outfit. Within the cup, which forms the rim proper, is a small cylinder, with threaded surface which fits into a hole in the bottom of the cup, and into the upper end of which the ball falls. The threads referred to cause the cup to rise or descend when it is turned. Steel shoes are provided which can be attached to the iron or bamboo markers so that they fit snugly in this inner cylinder. In this way pointed rods that cut up the putting greens are eliminated.



Three Views of Adjustable Hole Rim: One at Left is Holding a Marker, and Center One a Golf Ball, While the One at Right is Fitted with Adjusting Key



BY COURTESY OF THE NEW YORK EVENING WORLD

GREAT NEW YORK SQUARE NAMED FOR PERSHING

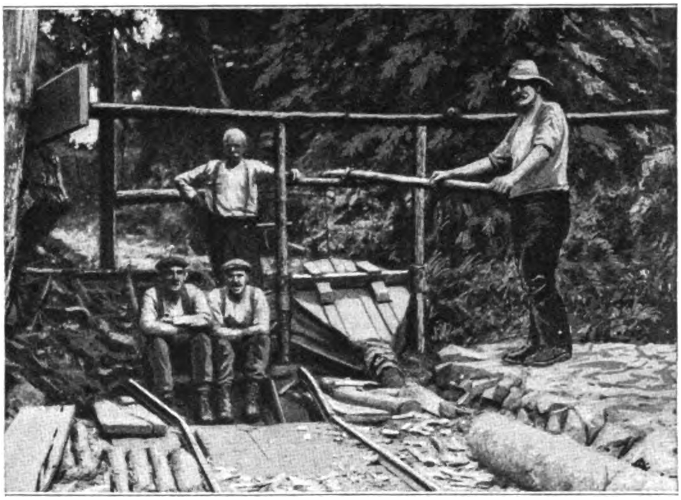
WHAT undoubtedly will be the most imposing group of modern hotels in the world, when the contemplated structures are finished, has as its center the Grand Central Terminal of New York City. Three of the hostelries have been finished for some time and one is just completed, while plans for the fifth, and in some respects the most splendid of the group, have been placed in builders' hands. These towering structures overlook a large breathing space in the heart of the city, which was recently named "Pershing Square." The fact that four subways and tunnels pass beneath the square indicates the importance of this metropolitan center. In front of the terminal is being constructed a great viaduct that will connect upper and lower Park Avenue.

COST OF WORLD WAR PLACED AT TWO HUNDRED BILLION

According to estimates prepared by the Federal Reserve Board and believed to be substantially correct, the aggregate direct expense incurred by the several belligerents in conducting the war, up to May 1, last, amounted to about $175,000,000,000. It is thought that the total sum spent up to the first of this year approximates $200,000,000,000. The public debt of the chief allied nations, May 1, is placed at about $105,000,000,000. The conduct of the war apparently cost the allies more than twice as much as it did the central powers, for the aggregate debt assumed by the latter up to the date mentioned is computed at $45,000,000,000. In this connection it is interesting to note that the antebellum debt of the seven chief belligerents amounted to only $25,000,000,000. The annual cost of supporting this was about $1,000,000,000, but the yearly burden hereafter, embracing interest and sinking fund, will probably be in excess of $10,000,000,000. Germany's per-capita burden is approximately three times greater than that of the United States for funds already expended, and obviously will be greater than that when the reconstruction obligation is shouldered. For instance, the United States, with a population of 110,000,000, has a national wealth of $250,000,000,000 with which to pay the $18,000,000,000 war debt already contracted. Germany, however, has 66,000,000 population and $80,000,000,000 wealth with which to meet its $35,000,000,000 war debt, represented chiefly by bonds held within its own country. In conclusion, it is worth noting that the cost of "putting on" a modern four-year world war is about equal to the entire national wealth of the United States.

¶The British have ordered the construction in this country of 20,000 tanks of moderate size, regardless of the return of peace. The machines are so designed that they can be used as farm tractors, if desired.

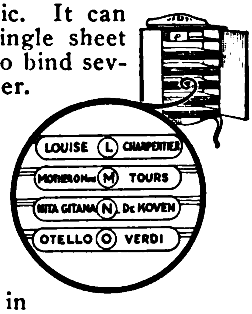
FORCE AIR DOWN MINE SHAFT WITH BLACKSMITH BELLOWS



Bellows Installed at the Mouth of a Mine Shaft in British Columbia, with Which Fresh Air was Forced Down to the Miners: The Man at the Right is Taking His Turn Operating the Bellows

Fresh air being urgently needed in a coal mine in British Columbia, and there being no suitable ventilating apparatus available, a bellows was obtained from a blacksmith shop and rigged up for use in the emergency. A framework of poles supported it and furnished a leverage for operating it. The miners worked the big bellows in shifts, sending fresh air to their fellows down the shaft by pipe line.

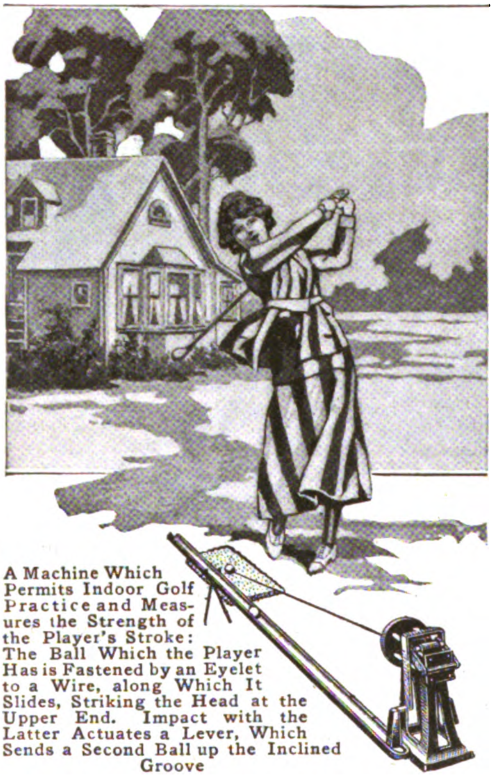
HANDY INDEX ATTACHMENT FOR SHEET MUSIC



An index tab on which a title and a composer's name can be written has been devised for the convenience of users of sheet music. It can be attached to a single sheet or used in helping to bind several sheets together. Between the space for the title and the space for the composer is a circle for the index letter or number. The tabs are supplied in three colors—a further aid in making it easy to find any selection, by permitting classification according to whether the music is vocal, orchestral, or a band selection.

MACHINE FOR PRACTICING GOLF INDOORS

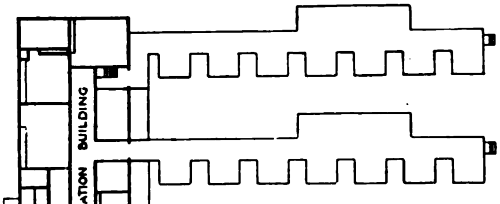
Golf practice which is genuinely helpful in developing the player's skill can be obtained at home, on shipboard, on the roof of an office building, or elsewhere, by using a new golf machine. The ball is placed on a mat, or pad, and when struck, slides up a taut, inclined wire, to which it is fastened by a suitable eyelet. At the far end of the wire it strikes a padded head, or buffer, which is connected by levers with a swinging foot suspended at one side of the machine. The impact of the ball against the head causes the foot to strike a second ball, sending it up an inclined trough, graduated in terms of yards. The distance this second ball travels indicates quite accurately the distance the same stroke would have sent the ball on a regular course.



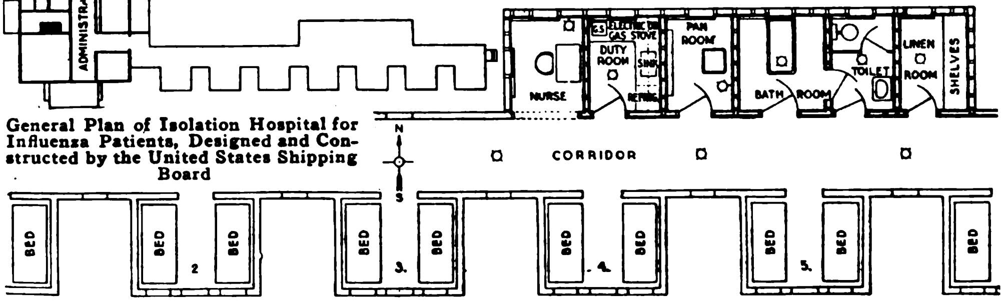
A Machine Which Permits Indoor Golf Practice and Measures the Strength of the Player's Stroke: The Ball Which the Player Has is Fastened by an Eyelet to a Wire, along Which It Slides, Striking the Head at the Upper End. Impact with the Latter Actuates a Lever, Which Sends a Second Ball up the Inclined Groove

"CUBICLE" HOSPITAL EMPLOYED IN FIGHTING INFLUENZA

In combating the influenza among several thousand apprentices training for the merchant marine, medical officers of the United States Shipping Board evolved a system of treatment that effectively checked the disease and reduced mortality. Fresh, cool air and sunshine were the chief healing elements employed. A special hospital of unusual design was constructed on an elevation. Its arrangement was governed by the desire to isolate the patients and give them abundant sunlight and air. Stretching at right angles from the administration building, a series of long pavilions was built. Each of these consisted of a steam-heated corridor giving access to a succession of "cubicles," or "bays," facing south. The separate compartments were made large enough to accommodate two beds and leave an aisle between them. To prevent transmission of germs from one patient to another, a sterilized sheet was suspended so as to divide the room. The roof of each cubicle was hinged so that one-half of it could be tilted back, opening the interior to air and sun. One of the walls consisted of a glazed sash, hinged so as to be swung outwardly. An



General Plan of Isolation Hospital for Influenza Patients, Designed and Constructed by the United States Shipping Board



Detail of One Wing of the Isolation Hospital, Showing the Bays, or "Cubicles," All Having South Exposure, and the Arrangement of Attendants' and Utility Rooms on the Other Side of the Corridor air space, a foot in depth, was also left around the top of each cubicle between its walls and the roof. The plan worked so well that it received the indorsement of Massachusetts medical authorities, who adopted it in checking the epidemic among the civilian population.

CANADA'S HUGE CENT PIECES TO BE DISPLACED

The big Canadian cent, which has been as much of a joke to Americans as the latter's huge silver dollars have been to their northern neighbors, promises to disappear in the course of time. It is announced that the Dominion is about to mint a one-cent piece which will be slightly larger than the Canadian dime. This would indicate that it will be about the size of the cents used in this country.

FIRST HORSEBACK PARTY ASCENDS MOUNT ADAMS

Formerly it was thought the summit of Mt. Adams, in the Columbia National Forest, which rises to a height of 12,307 ft., could be reached only on foot. But recently a forest ranger and his wife, mounted on sharp-shod horses, began the ascent at seven in the morning and reached the top at three in the afternoon, their animals negotiating the snow fields without serious difficulty. Special local interest attaches to the feat because a club in Portland, Ore., is composed exclusively of persons who have climbed Mt. Adams or some other peak whose summit is considered accessible only on foot. Thus, technically, the status of some members has been brought in question.

This Man and His Wife, Riding These Horses, Recently Ascended to the Summit of Mount Adams. They are Believed to Be the First to have Ridden on Horseback to the Top

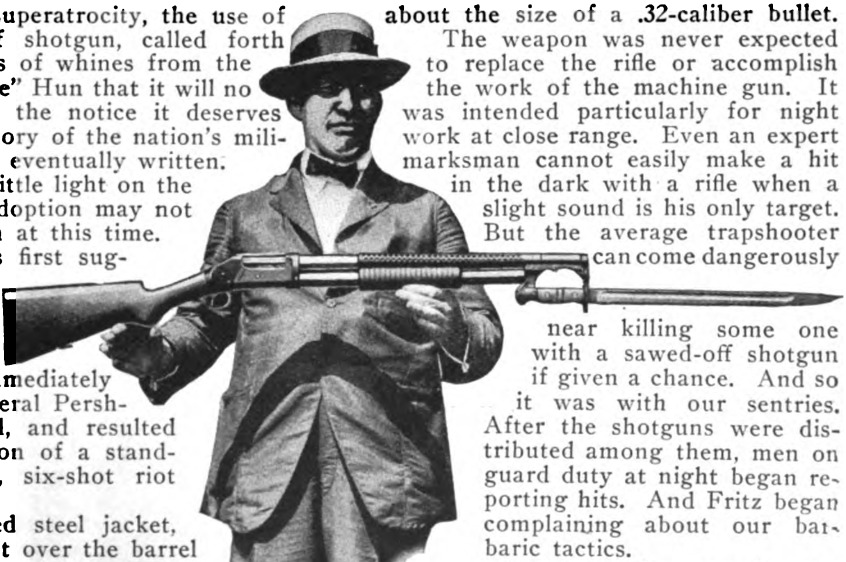
TRENCH GUN IS RIOT PIECE FITTED WITH BAYONET

America's superatrocity, the use of the sawed-off shotgun, called forth such a chorus of whines from the "sportsmanlike" Hun that it will no doubt receive the notice it deserves when the history of the nation's military efforts is eventually written. Therefore, a little light on the story of its adoption may not be amiss even at this time. The idea was first suggested to the War Department by a Georgia engineer. It immediately met with General Pershing's approval, and resulted in the adoption of a standard 12-gauge, six-shot riot gun.

A perforated steel jacket, designed to fit over the barrel and carry the bayonet, was added to the piece. The ammunition used consisted of cartridges containing three and a half drams of smokeless powder and nine pellets, each about the size of a .32-caliber bullet.

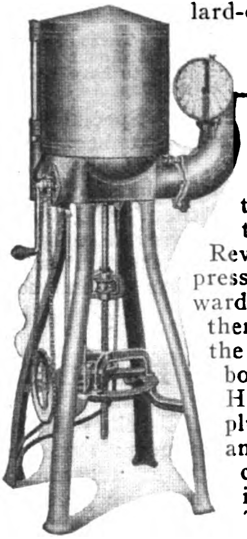
The weapon was never expected to replace the rifle or accomplish the work of the machine gun. It was intended particularly for night work at close range. Even an expert marksman cannot easily make a hit in the dark with a rifle when a slight sound is his only target. But the average trapshooter can come dangerously near killing some one with a sawed-off shotgun if given a chance. And so it was with our sentries. After the shotguns were distributed among them, men on guard duty at night began reporting hits. And Fritz began complaining about our barbaric tactics.

In use, the trench gun proved even more effective than had been expected. It was found that by firing from the hip, holding back the trigger, and pumping, a veritable



Close View of the American Trench Gun, Otherwise a 12-Gauge Riot Piece Fitted with a Perforated Steel Jacket and Hun-Hating Bayonet barrage effective for 100 yards or more, could be laid down. Also it was found that soldiers who had shot clay pigeons in peace time could play pranks with grenades hurled from the Hun's trenches. That is, their well-aimed shots frequently checked grenades, causing them to fall and explode on the German side of "No Man's Land."

LARD-DISPENSING MACHINE SAVES TIME AND MONEY



Guesswork and waste resulting from retailing lard in small quantities are done away with by using a new lard-dispensing machine. A 50-lb. pail of lard is placed, inverted, in a chamber supported by a standard, and by turning a crank, a plate is forced up through the lard to the bottom of the can. Reversing the crank presses the lard downward into a conveyor and thence into a cup at the upper end of an elbow-shaped passage. Here it actuates a plunger, causing the amount of lard in the cup to be accurately indicated on a dial. The cup can be emptied by swinging it to one side and forcing the plunger back to its former position.

STATIC INTERFERENCE IN RADIO COMMUNICATION ELIMINATED

What is considered to be one of the most important scientific discoveries of recent years has been announced by the Marconi Wireless Telegraph Company. Static interference, the perplexing condition that has been encountered in radio communication, has been overcome after years of effort on the part of the chief engineer of the Marconi company. Wireless equipment can now be used 24 hours a day, 365 days in the year, instead of only during periods of favorable atmospheric conditions.

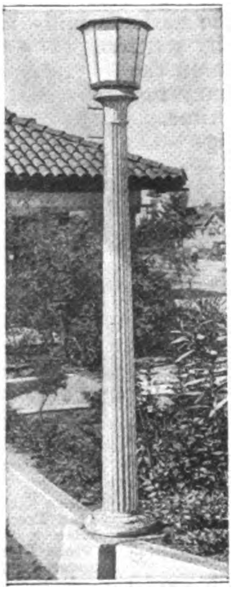
By static is usually meant the uncontrolled electricity present in the atmosphere. At times it produces so much noise in the receivers that it renders radio signals indistinguishable, and thereby prostrates service.

The new invention, the outgrowth of discoveries made by the engineer, not only protects receiving apparatus from the effects of transient electricity, but also prevents waves sent out by one station from interfering with those of another. Furthermore, it makes unnecessary the erection of enormous towers for the receiving antenna. Aerials need be strung no higher than ordinary telegraph wires.

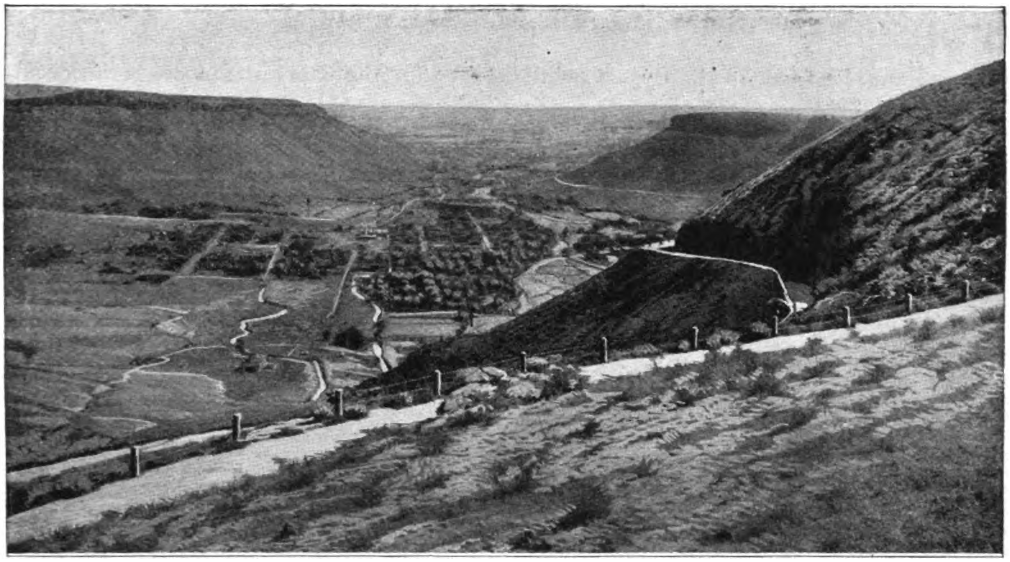
All was ready for announcement of the invention when the United States entered the war. Instead of being made known, however, it was placed at the disposal of the government. The Navy Department put it in use immediately and caused its adoption by the allies. During the war it did valuable service.

Technical details of the invention are still withheld. The inventor, however, has remarked that he worked on the theory that static electricity, contrary to the belief of many engineers, followed definite laws. His invention, it is contended, has removed the chief obstacle that has stood in the way of universal commercial extension of wireless telegraphy. Also, it will no doubt hasten the development of wireless telephony.

EIGHT-PANEL STREET LAMP PREFERABLE TO A GLOBE



The especially attractive street lamp shown herewith is preferable, it is claimed, to various types of globes, for when one of the latter is broken, to replace it costs several dollars, in addition perhaps to the cost of another light bulb, while injury to this lamp usually involves but one or possibly two of the eight panels, which can be replaced for about 50 cents each. The top, which slopes slightly toward the sides from the center, serves to reflect the light downward, while many globes tend to throw more light upward than down.

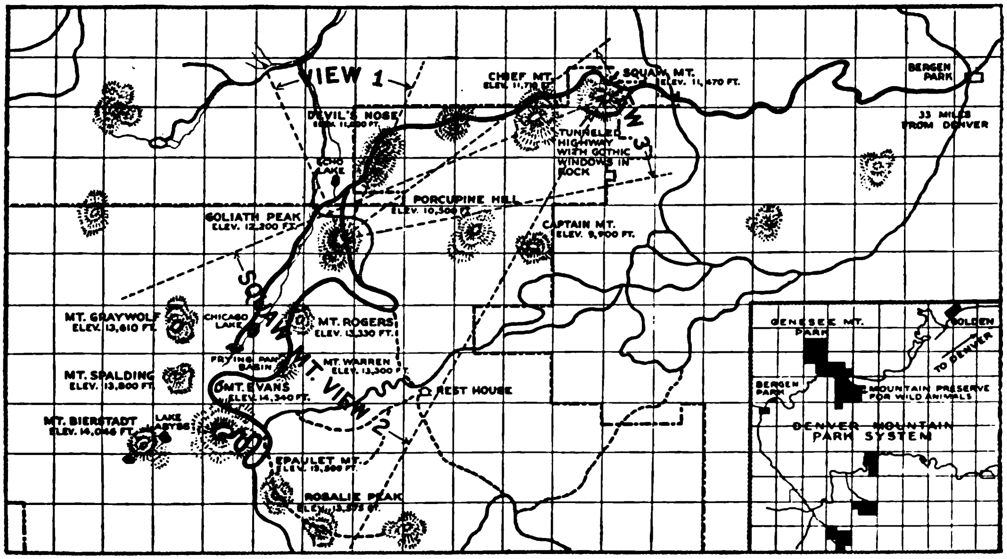


This Magnificent View is Obtained from the Lower Hairpin Turn on Lookout Mountain, in Colorado, Where the Road to Mount Evans Begins to Wind among the Mountains. In the Middle Distance Is the City of Golden, "the Portal of the Plains"

A MOTOR ROAD ON THE SKY LINE OF AMERICA

By J. E. MURPHY

MAKING easily accessible fastnesses of the Rocky Mountains that can now be reached only by persons hardened to mountain travel, the automobile road planned and already partly built by the city of Denver, Colo., to connect the heart of that city with the summit of Mount Evans, will be one of the most remarkable mountain highways in the world. With a mile-high start at Denver, the road will wind over titanic peaks and through chasms of the roughest and most picturesque part of the Colorado Rockies, making a clear rise of 9,000 ft. in 65 miles, and terminating on a summit that is higher than Pikes Peak. Over the westerly 10 miles of its course it will follow the sky line of mountains that rank in height with the peaks of the continental divide. From end to end it will be a thoroughly prac-

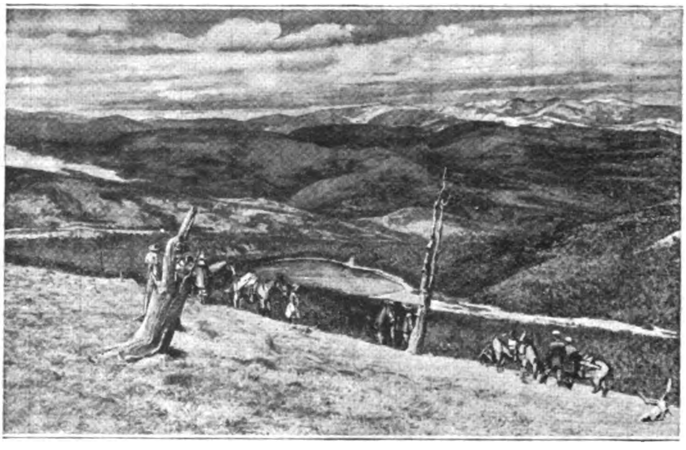

VIEW 1
CHIEF MT. ELEV. 11,710 FT.
SQUAW MT. ELEV. 11,470 FT.
BERGEN PARK
33 MILES FROM DENVER
DEVIL'S NOSE ELEV. 11,200 FT.
TUNNELED HIGHWAY WITH GOTHIC WINDOWS IN ROCK
3
ECHO LAKE
PORCUPINE HILL ELEV. 10,500 FT.
GOLIATH PEAK ELEV. 12,200 FT.
CAPTAIN MT. ELEV. 9,900 FT.
MT. GRAYWOLF ELEV. 13,610 FT.
CHICAGO LAKE
MT. ROGERS ELEV. 13,330 FT.
SQUAW MT. VIEW 2
FRYING PAN BASIN
MT. WARREN ELEV. 13,300 FT.
MT. SPALDING ELEV. 13,800 FT.
MT. EVANS ELEV. 14,340 FT.
REST HOUSE
MT. BIERSTADT ELEV. 14,046 FT.
LAKE ABYSS
EPAULET MT. ELEV. 13,500 FT.
ROSALIE PEAK ELEV. 13,575 FT.
GENESEE MT. PARK
GOLDEN
TO DENVER
BERGEN PARK
MOUNTAIN PRESERVE FOR WILD ANIMALS
DENVER MOUNTAIN PARK SYSTEM

The Route of the Motor Road Which Is to Be in Effect an Extension of Denver's Mountain Park System: The Highway will Wind over Titanic Peaks and through Picturesque Chasms, Making a Rise of 9,000 Feet in 65 Miles, with Grades That Nowhere Exceed Six Feet in One Hundred Feet tical automobile road, 20 ft. in width, with grades that nowhere exceed 6 ft. in 100 ft.

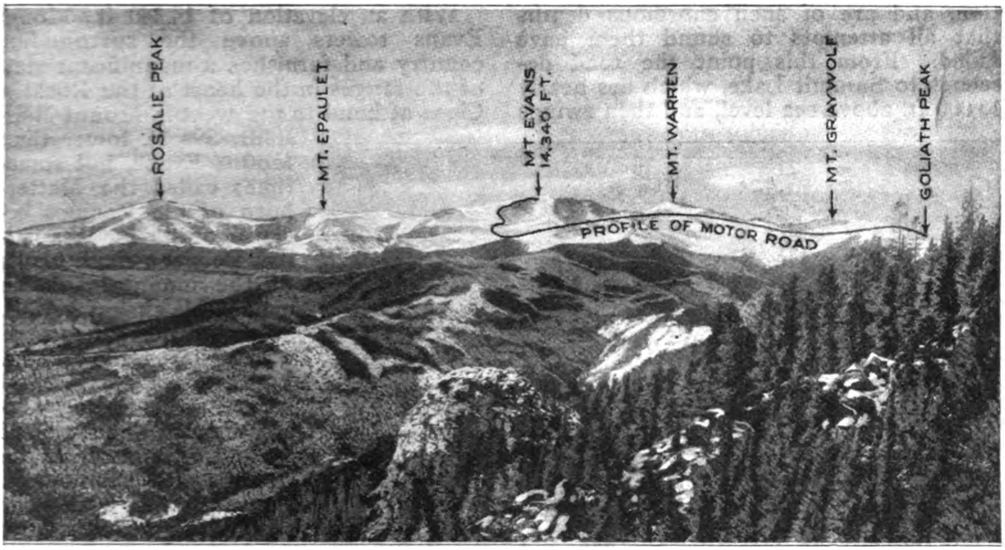
The entire project is estimated to cost about $750,000. Although a big undertaking in itself, the construction of this road is in effect an extension of the Denver mountain-park system, which has been developed in the past five years. These mountain parks, seven in number, are connected with the city by a 65-mile circle drive, 27 miles of which is in the mountains. They have a total area of about five square miles and are scattered over an area of approximately 100 square miles. The Mount Evans road proper begins at Bergen Park, 33 miles from the city. The mountain-park district lies east and southeast of Bergen Park, while the Mount Evans road strikes straight west from this point into the heart of the Rockies. Two gateways give access to the mountain parks as well as to the Mount Evans road. One of these is at Golden and the other at Morrison, the latter being the entrance to Bear Creek Valley. The northern route, passing through Golden, is the direct road to Mount Evans. It is on the road from Golden to Bergen Park that the city of Denver has established a mountain preserve for the wild animals of the zoo, conducting an experiment that is attracting nation-wide attention. In a 400-acre tract, inclosed by a woven-wire fence 10 ft. high, are small herds of deer, antelope, elk, and buffalo, all living in a wild state and thriving because of this return to their natural environment. The experiment which has proven so successful was described in Popular Mechanics Magazine for December, 1917. The tract is located on the slope of Genesee Mountain, and can be reached over three automobile roads.

An Example of the Grotesque "Elfin Wood" Found at the Timber Line: These Trees Show the Effect of Mountain Storms

A nine-mile section of the Mount Evans road extends from Bergen Park to Soda Pass on Squaw Mountain. The length of the road from Soda Pass to the summit of Mount Evans is about 19 miles. The entire line has been surveyed and located, and it is planned to build additional sections from year to year as funds are available. From Soda Pass the main road will swing around the north slope of Squaw Mountain, while one of the two scenic detours that form part of the project will branch off the main road on the northeast slope of Squaw and will follow the precipitous south slope of the mountain. Over a part of this detour the road will be tunneled through the solid rock, and will be lighted

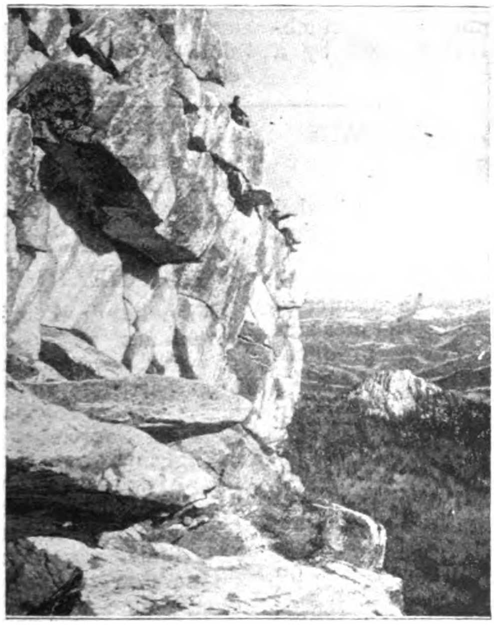


The Continental Divide from Goliath Peak, as Indicated by "View 1," Marked on the Map on the Preceding Page: In the Foreground Is Echo Lake, While the Slope of Devil's Nose Is at the Right



Sky-Line Drive along Mount Evans Range as Seen from Squaw Mountain, around Which the Road Passes: The Sector Marked "View 2," of the Map on Page 231, Shows the Scope of This Marvelous Panorama. The Summit of Mount Evans, the Terminus of the Drive, Rises to an Altitude of 14,340 Feet—Higher Than Pikes Peak

by Gothic windows cut in the face of the cliff, a feature that is unusual in this country, although it has been used to a limited extent in Europe. This detour will be a trifle more than a mile in length.



A Cliff on the South Side of Squaw Mountain Which will be Tunneled for the Scenic Detour: The Tunnel will have Arched Windows, through Which the Valley Below can be Viewed

After leaving Squaw Mountain, the route lies along the slopes of Chief Mountain, Warrior Mountain, and Devil's Nose, passing along the shore of Echo Lake, which is two miles above sea level, and climbing to timber line just below the summit of the rounded dome of Goliath Peak. From Echo Lake the second scenic detour branches off the main road, following four miles up Chicago Creek to the two Chicago lakes. Timber line in Colorado is at an elevation of 11,500 ft., and from Goliath Peak to the end the road is nowhere below this altitude. A curious feature of tree life, found only at timber line, is the so-called elfin wood. These trees, which seem more dead than alive, are mainly Engelmann spruce and flexible pine, and their grotesque shapes and attitudes are due to the hard conditions under which they grow — particularly to the high winds that prevail at this altitude.

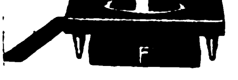
Beyond the summit of Mount Rogers the road emerges suddenly on the brink of a 2,000-ft. precipice, from which the traveler looks straight down into the depths of the Frying Pan Basin, a gigantic natural amphitheater inclosed on three sides by cliffs from 1,200 to 2,000 ft. high. In the bottom of the Frying Pan lie the two Chicago lakes, which are reached by the detour that starts at Echo Lake. These lakes are at about 12,000 ft. elevation, and are of such enormous depths that all attempts to sound them have failed. From this point the road descends to Summit Lake, which lies nearly 13,000 ft. above sea level, and then swings to the east side of Mount Evans, climbing to the summit of this peak by a series of hairpin turns.

How the Comfort of Travelers is Provided for in the Bear Creek Valley: Connected with Each Shelter Is an Open-Air Oven with a Double Fireplace

With an elevation of 14,340 ft., Mount Evans towers above the surrounding country and furnishes a magnificent view of the ranges in the heart of the Rockies. Close at hand to the west is Mount Bierstadt, 294 ft. lower than Mount Evans, but sometimes called the Matterhorn of the Rockies because of its inaccessibility. Between these giants of the mountains is an impassable chasm 2,000 ft. deep, in the bottom of which lies Lake Abyss. There are more than 50 lakes in the Mount Evans district, and many of these are visible from the summit of the mountain. To reach the peak now requires an arduous trip, mainly by horseback, over difficult and dangerous trails, with the necessity of a camp over night on the way. With the automobile road completed, it will be possible to make the trip from Denver in comfort in barely more than two hours.

DEVICE FOR FILLING GRAIN TESTER UNIFORMLY

For ascertaining the weight per bushel of grain, dealers commonly weigh a pint, or more, and make computations from the result obtained. But the manner of filling the measure often produces varying results because the grain is not always uniformly packed. To secure uniformity in weighing, an outfit for weight-per-bushel testers has been put on the market. It provides a funnel of a certain size, suspended 2½ in. above the measure by means of a swinging arm, and through it the grain is poured, whereupon the funnel is swung to one side, and a second support, to which a scale beam is fastened, is brought into position. The weighing is done after all grain heaped above the brim has been struck off. Surrounding the measure is a wooden base with a circular metal guard which catches the surplus grain and discharges it into the pan in which the measure stands.



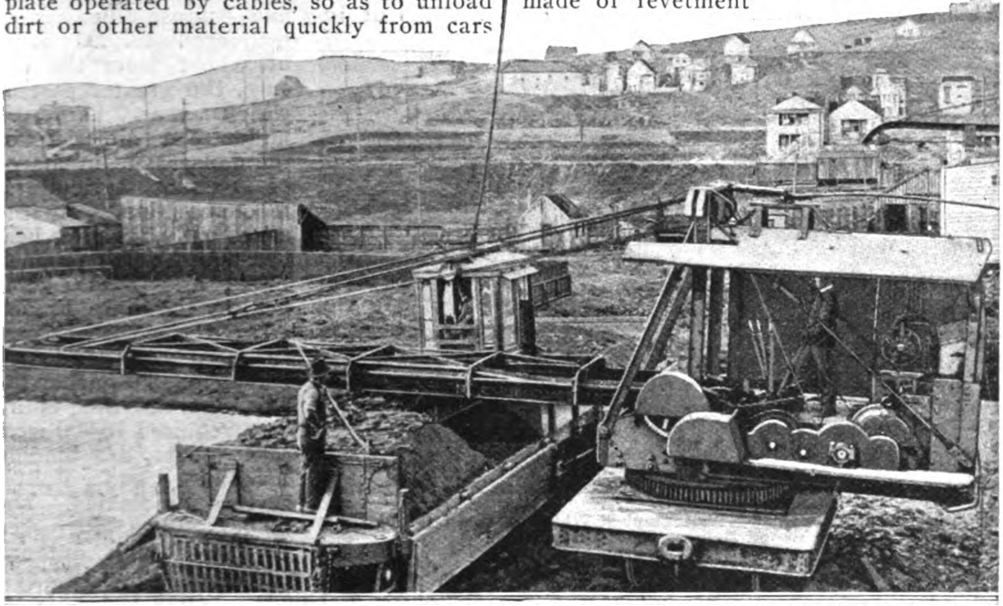
YANKEE AIRMEN OUTFOUGHT HUN NEARLY FOUR TO ONE

Nine hundred and twenty-six German aeroplanes and 73 balloons were destroyed by American airmen during their brief participation in hostilities. Yankee losses totaled 265 planes and 38 balloons. Between September 12 and the final day of fighting, our air forces dropped 120 tons of high-explosive bombs on and behind the enemy lines. When the armistice was signed, America had 740 planes, 744 pilots, 457 observers, and 23 aerial gunners in action. Three hundred and twenty-nine of the planes were of the pursuit type, 296 were for aerial observation, and the remainder consisted of bombing machines.

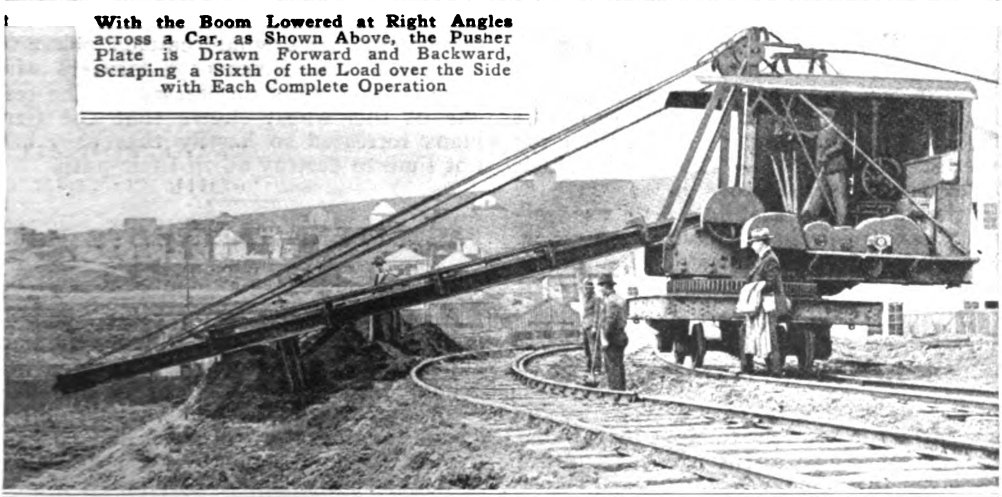
ℂSeveral of the converted yachts purchased by the government to fight the U-boats have recently been allotted to the Coast and Geodetic Survey, the Lighthouse Bureau, the Bureau of Fisheries, and the Coast Guard.

STREET-RAILWAY CRANE UNLOADS CARS OF DIRT

In one of the western cities a surface-traction company has equipped the boom of a mobile electric crane with a pusher plate operated by cables, so as to unload dirt or other material quickly from cars run alongside. As a car is brought up, its hinged sides are dropped and the boom is lowered across it at right angles. The pusher is then drawn forward and backward across the car, discharging a sixth of the load with each complete operation. After several carloads of dirt have been dumped in this manner, the boom may be inclined and the pusher employed to distribute the pile evenly on the embankment when a fill is being made or revetment work executed. Obviously the machine saves considerable time and much labor.



With the Boom Lowered at Right Angles across a Car, as Shown Above, the Pusher Plate is Drawn Forward and Backward, Scraping a Sixth of the Load over the Side with Each Complete Operation



This Shows How the Equipment may be Used to Distribute a Pile of Dirt, or Refuse, on an Embankment After Several Cars have been Unloaded. In This Way the Work is Accomplished Quickly and with a Considerable Saving of Labor

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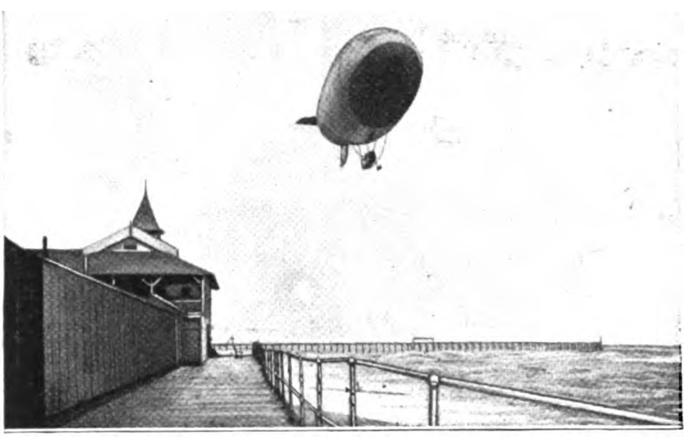
¶Camouflage coats are disappearing from ocean vessels, each craft now coming from the ways being painted a color designated by the government.

YANKEE DIRIGIBLES DID PART IN GUARDING COASTS

Much of the burden of patrolling our harbors and coast lines during the war fell to the lot of American-built dirigibles. This is made particularly interesting because of the fact that before our participation in the hostilities, our navy possessed exceedingly few lighter-than-air ships. It was only slightly more than a year ago that government requirements were exceeded by a comfortable margin in the official tests of the first group of flexible dirigibles under construction for the Navy Department. The vessels, which have proved satisfactory in service, are of the same type that has been used almost exclusively in England and France, and are popularly known in the former country as "blimps."



An American-Built "Blimp" Photographed While on Coast-Patrol Duty off Belmar, New Jersey

CORNCOBS MAY BECOME SOURCE OF REVENUE FOR FARMER

A possible new source of revenue for the farmer is brought to light by the discovery of Department of Agriculture chemists that glue, cellulose, and glucose can be obtained from corncobs—one of the great waste products of the corn belt. The investigators believe that here is a chance for the development of a profitable industry, but point out that to put it on a commercial basis will require a large and costly plant.

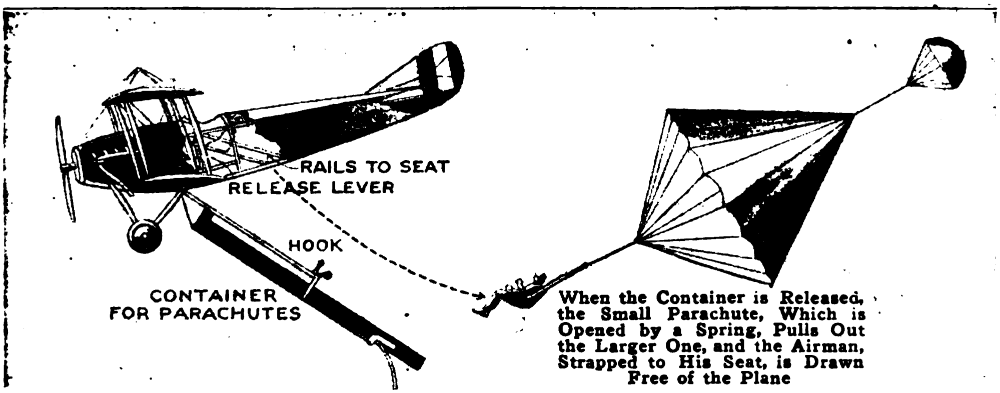
¶The French Academy has awarded a gold medal to the American Red Cross for "admirable work."

RECOVERED WHEAT FIELDS HARVESTED BY FRENCH

That a successful offensive in modern warfare often means much besides fighting is shown by the fact that during the months of July and August allied forces recovered 137,000 acres of wheat from the enemy, the greater part of which was harvested under the direction of the department in charge of French agricultural reconstruction. In the zones of 16,555 acres held by the Fourth French Army and 18,217 acres held by the Sixth French Army the work was particularly rapid and well managed. To gather the wheat from the entire area required 16,900 men, 3,300 horses, 823 binding machines, and 9,800 scythes or sickles. The binders were furnished by the French authorities, which also supplied over 100 new threshing machines. When the harvesting and threshing was completed, all this equipment was sold at reduced prices to the farmers or groups of farmers who have been victims of the war. The rescue of this wheat shows that the Germans retreated so hastily that they had not time to destroy all in their path.

AEROPLANE PARACHUTE HAS NOVEL FEATURES

Aeroplane parachutes received considerable thought in America during the war, and several interesting inventions resulted. Among these there is one that seems sufficiently novel to warrant notice, even though it apparently failed to gain the approval necessary for its adoption. A double parachute is carried in a container beneath the fuselage and connected to the pilot's seat, which is so arranged that it is drawn rearward and downward through the body, carrying the airman with it, when the parachute is released and allowed to open. The parachute proper has connected to it a small parachute of the umbrella type which is opened by spring action. When it is ejected, it catches the air instantly and draws the large one after it. As the lat-



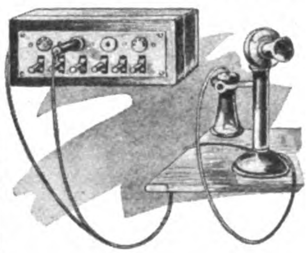
When the Container is Released, the Small Parachute, Which is Opened by a Spring, Pulls Out the Larger One, and the Airman, Strapped to His Seat, is Drawn Free of the Plane

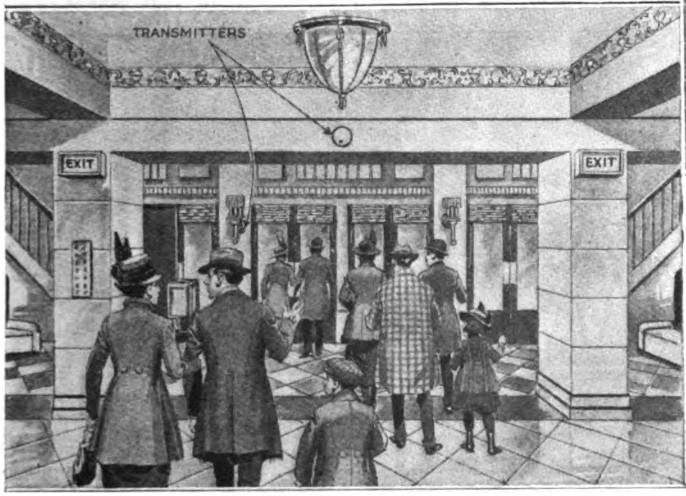
ter bellies, and the hinged container swings forward out of the way, the seat, in which the pilot is strapped is drawn out. Although the invention embodies features of questionable merit, the general scheme, at least, is interesting.

LOUD-SPEAKING TELEPHONES USED IN MOVIE THEATER

One large moving-picture theater in Chicago is equipped with loud-speaking telephones connected with the manager's office. They serve, to all practical purposes, the function of dictaphones. Their province is to convey the audience's verdict of a photoplay to the manager. The theater is one which runs multireel pictures and bills them for a week's stand. Obviously, therefore, it is of importance to know the public's decision on the first night of a run, so that, if it is unfavorable, the bill can be changed immediately and the house filled on the following evening. The loud-speaking telephone scheme was adopted to make this possible, and according to the claims of the management, it has saved thousands of dollars. Transmitters are concealed in the aisles of the theater and in the lobby. A switchboard at the manager's desk enables him to "plug in" on any part of the house and listen to what is said. As a rule moving-picture goers will express their opinions of the show when departing.

The Switchboard Enables the Manager to Make Connections with Any of the Transmitters

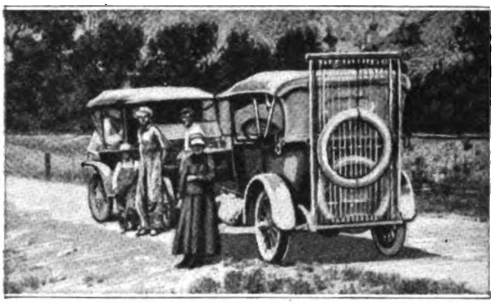




Lobby of Moving-Picture Theater with Telephone Transmitters Concealed in Convenient Places, Which Enable the Manager of the Show to Overhear Any Expressions of Criticism or Praise of the Performance from the Patrons: Similar Transmitters are Also Installed in the Aisles of the Auditorium. At the Right Are Shown the Switchboard and Telephone Used in the Manager's Office

AUTO TOURIST HINGES BED TO REAR OF CAR

By hinging a bed spring to the rear of a touring car and supplying means for holding it in a vertical position when not in use, a western motorist has provided himself with a comfortable sleeping place which has proved satisfactory during more than 10,000 miles of auto travel. When the springs are held upright, spare tires are fastened to them.

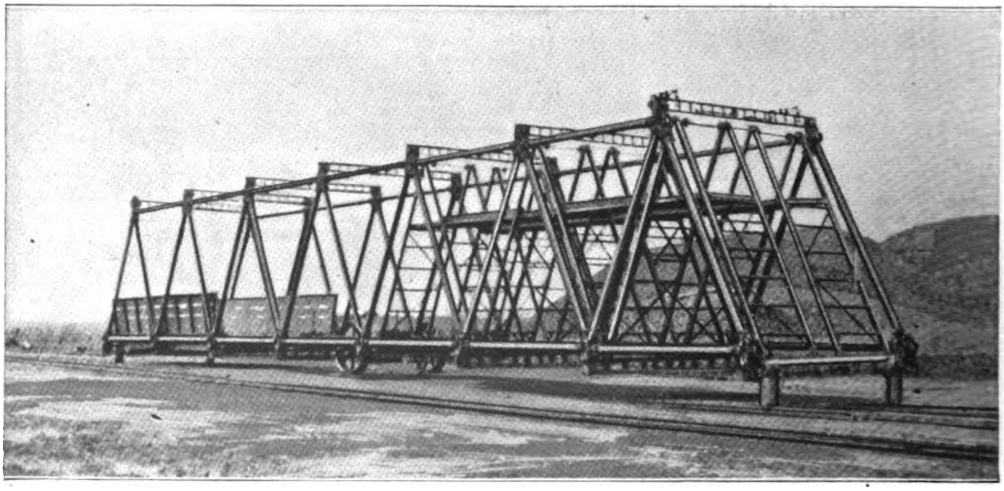

Rather Than be Troubled with Folding or Collapsible Beds for Overland Touring, This Motorist has Hinged a Bed Spring to the Rear of His Car

NINE DINE THANKSGIVING DAY HIGH UP IN AEROPLANE

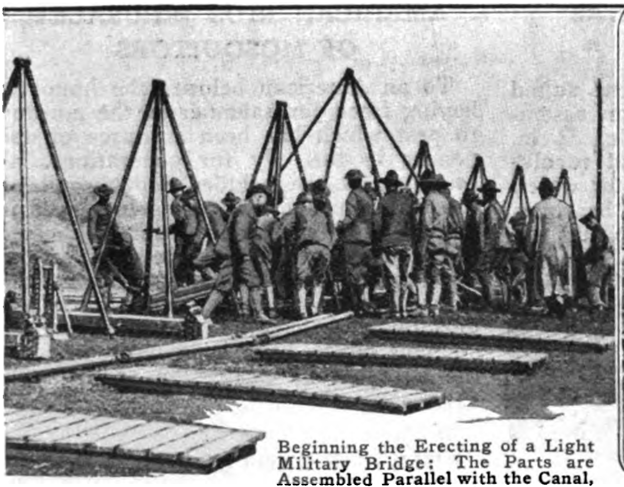
A Thanksgiving dinner which is unique in the history of that national holiday was enjoyed by nine men while in an aeroplane 2,800 ft. above the earth. The memorable flight began from the new landing field of the aerial-mail service at Elizabeth. N. J., and the machine used was one built for the New York-Chicago mail delivery. Owing to bad weather conditions the meal lasted only 22 minutes, but that was sufficient time for serving roast turkey with dressing, a variety of vegetables, and dessert.

ARMY ENGINEERS LEARN SPEED IN BRIDGE BUILDING

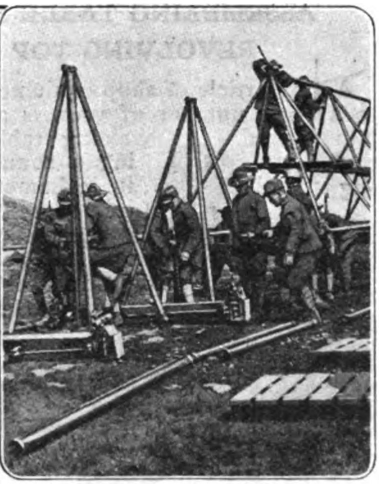
That nothing which can possibly be foreseen is left to guesswork in modern warfare, is demonstrated by the work which was done in our army engineering school in France. The instruction covered the building of bridges, construction of dugouts, the placing of wire entanglements, camouflage work, sound ranging, interpretation of aerial photographs, etc. Time was a vital factor in all this training, and to get results most quickly, much of it was given in the field under conditions closely resembling actual warfare. As far as possible, operations were standardized, and each man learned to do certain tasks almost automatically. A well-trained company was able, for example, to assemble a steel footbridge and place it over a 50-ft. stream in less than eight minutes. In building trenches, the pupils solved all the problems met with at the front, such as providing proper drainage, the placing of concealed observation posts, and many other difficult tasks.


BY COURTESY OF THE ENGINEERING NEWS RECORD

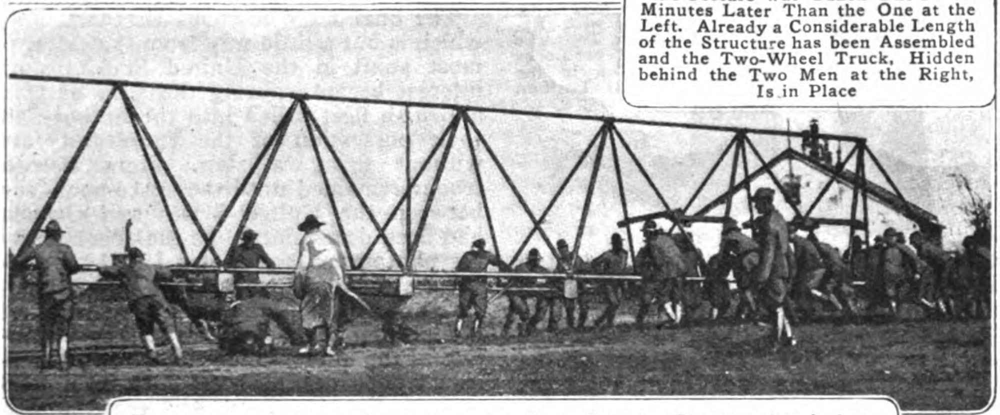
Heavy Bridge Which American Boys in the Army Engineer School in France Learned to Construct in Quick Time: The Wheels in the Center are Employed in Rolling It into Position



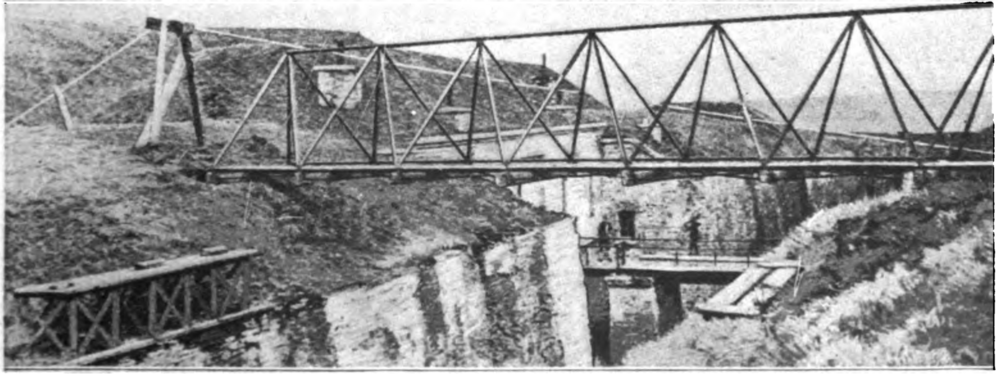
Beginning the Erecting of a Light Military Bridge: The Parts are Assembled Parallel with the Canal, on Its Bank



This Picture was Taken But a Few Minutes Later Than the One at the Left. Already a Considerable Length of the Structure has been Assembled and the Two-Wheel Truck, Hidden behind the Two Men at the Right, Is in Place



The Bridge was Finished in Such Quick Time That the Photographer had to Hurry to Change His Plates Fast Enough. Here the Men are Shown Swinging It Around into Position, Preparatory to Thrusting It across the Canal. This Practice in Acquiring Speed Is of the Utmost Importance, for Bridges of This Type Often must be Constructed under Fire

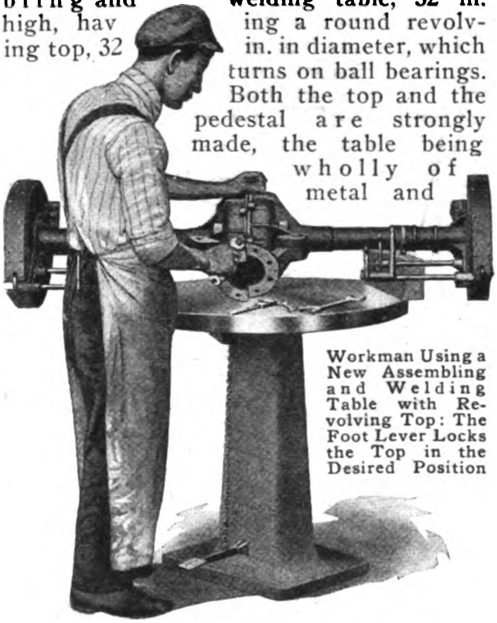


The Structure Launched and in Position on Its Abutments: The Time That Elapsed between Taking This Picture and the One in the Upper Left-Hand Corner Was Eleven and One-Half Minutes. Later the Feat was Performed in Even Less Time. Because of the Manner of Launching, It Was Necessary to Make This Structure 104 Feet Long to Give a Useful Span of 56 Feet. The Extra Bays have Already been Removed

PHOTOS BY COURTESY OF ENGINEERING NEWS-RECORD

ASSEMBLING TABLE HAS REVOLVING TOP

A new article of shop equipment, suited to a large number of uses, is an assembling and welding table, 32 in. high, having a round revolving top, 32 in. in diameter, which turns on ball bearings. Both the top and the pedestal are strongly made, the table being wholly of metal and weighing 425 lb. The base measures 16 by 20 in. Vises or clamps can be fastened to the edge of the top, and the latter can be turned to bring the work into the most favorable light. A locking device, operated by a foot lever, holds the top securely in any one of 36 positions. If desired, a second top, 24 in. in diameter, can be used interchangeably with the larger one.



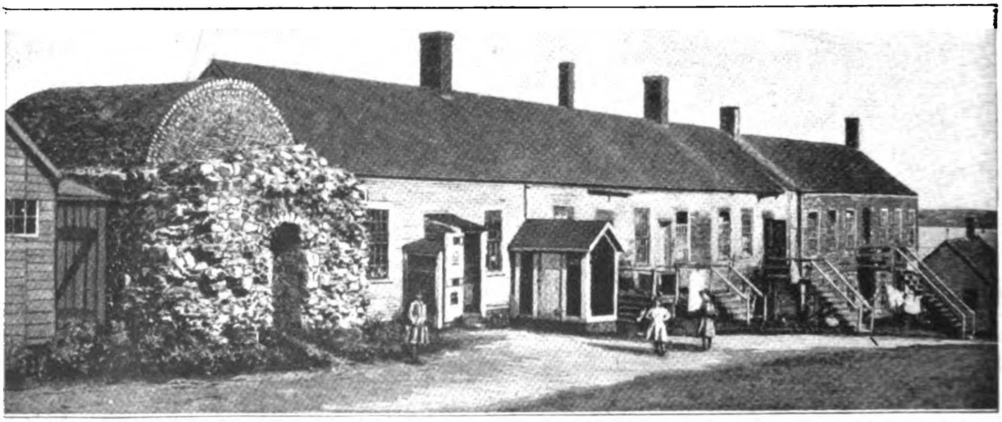
Workman Using a New Assembling and Welding Table with Revolving Top: The Foot Lever Locks the Top in the Desired Position

AMERICAN RIDS JERUSALEM OF MOSQUITOES

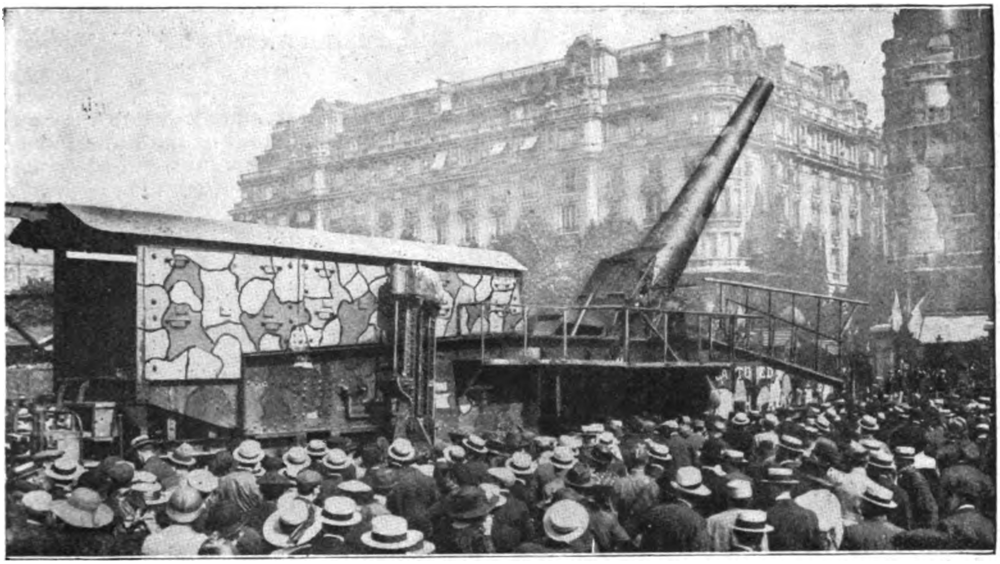
To an American belongs the honor of having freed Jerusalem from the mosquito pest which has been a source of epidemics in the city for generations. A crusade, which included putting oil on the water in some 1,350 cisterns, was in charge of a sanitarian from Rochester, N. Y., whose work of a similar nature in the Panama Canal Zone won such widespread praise. The extermination of the mosquitoes is but one of many beneficial changes which have been wrought since the British took possession of the Holy City.

RUINS OF CENTURY-OLD FORT IN EASTERNMOST MAINE

The quaint old town of Eastport, Me., which is but a little way from the easternmost point in the United States, is of interest because during the War of 1812 a British fleet sailed into the harbor and took possession of the town and fort without firing a shot. Here British troops remained until the exact boundary between the United States and Canada had been determined. In the accompanying photograph are shown buildings constituting part of the old fort. The structure at the left is the crumbling ruins of the powder magazine. With the exception of the interval indicated above, American troops occupied the fort from 1808 until 1875. In the latter year, it was abandoned and later the property was sold to private individuals, who turned the buildings into dwellings.



Buildings Forming Part of the Fort at Eastport, Maine, with Remains of the Old Powder Magazine at the Left: With the Exception of a Period during and Following the War of 1812, American Troops Occupied the Fort from 1808 until 1875



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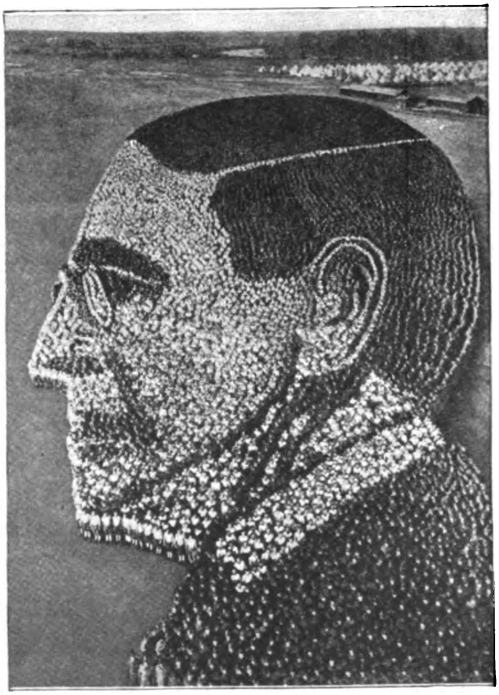
An Unusual Trophy of the War: A Big German Gun on a Camouflaged Railway Carriage, Exhibited in Champ de Mars, Paris

BIG GERMAN GUN EXHIBITED IN SQUARE AT PARIS

One of the latest and most interesting of the war relics to find its way to Paris is a powerful 11.2-in. German gun mounted on a large railway carriage. The piece, elaborately camouflaged, was captured by Australian troops and inspected at the front by Premier Clemenceau and Marshal Foch before it was removed to the capital and placed on exhibition in Champ de Mars. The capture of big guns of this type was not common during the war, and the prize therefore has received especial notice. In this connection it is interesting to know that a second gun of the same pattern was taken from the Hun a short time after the first one fell to the allies, which was not long before the conclusion of fighting.

THOUSANDS OF SOLDIERS MAKE LIVING PICTURE OF WILSON

Of the many "living" pictures for which great masses of soldiers have posed, none has required greater skill in arranging the men than the one taken at Camp Sherman, Chillicothe, Ohio, representing the profile of President Wilson. Considering the difficulties of using human figures to produce all the lines and shading in a likeness of a face, the result obtained is truly remarkable. The lighter portions of the picture were made by soldiers who wore no coats or hats, while in the darker sections the men were in full uniform. Nearly 50 men were required to represent one lens of the president's eyeglasses. There were 21,000 men in the picture.



COPYRIGHT, MOLE AND THOMAS

One of the Most Difficult to Pose of the Many "Living" Pictures in Which Our Soldiers have Appeared: This Likeness of the President Was Made Up of 21,000 Men, at Camp Sherman, Chillicothe, Ohio

FISHING IN THE U-BOATS' WAKE

How the Sea Gulls Betrayed Hundreds of German U-Boats to the Advantage of Allies and Fishermen

By LLOYD SEAMAN

IN the wealth of strange secrets that the sea is giving up now when the finger is off the lips of sailing men, none is more strange and grewsome than the "Sea-Gull Mystery," another "Ancient Mariner and the Albatross" theme, fit to rival in prose-fact the epic poem of Coleridge.

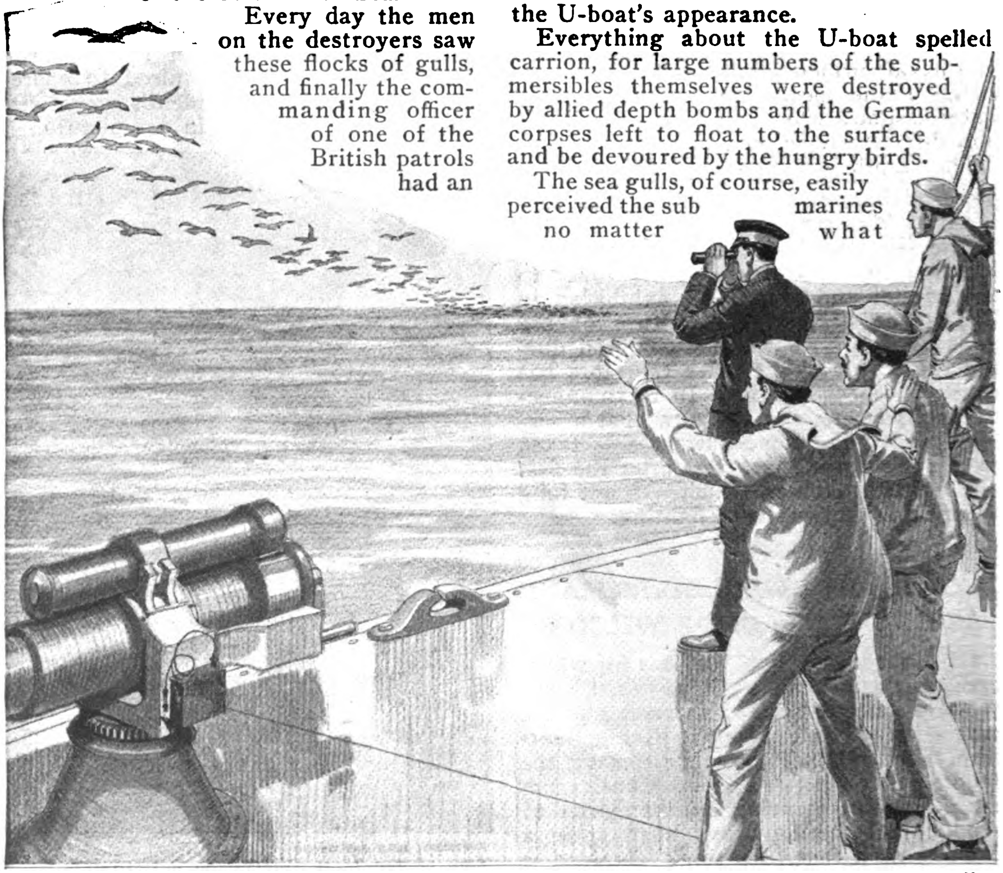
British and American sailors, engaged in antisubmarine warfare, were puzzled for months by the strange actions of great flocks of white sea gulls coursing in definite and queer paths over the water a few feet above the surface. Old salts knew that sea gulls invariably follow sharks, hoping to pick from their murderous attacks pieces of carrion, slivers of mangled fish, and neglected bits of the sharks' victims. But all sailors knew that no sharks came so far north as the English Channel, the Irish Sea, not to speak of the cold North Sea.

Every day the men on the destroyers saw these flocks of gulls, and finally the commanding officer of one of the British patrols had an inspiration. He steamed close to the head of the flock, cut across its path and loosed a half dozen depth bombs, timed to explode at different depths. There was a wild frothing of the waves, and a few minutes later oil, bubbles, and finally wreckage and corpses from a U-boat came to the surface.

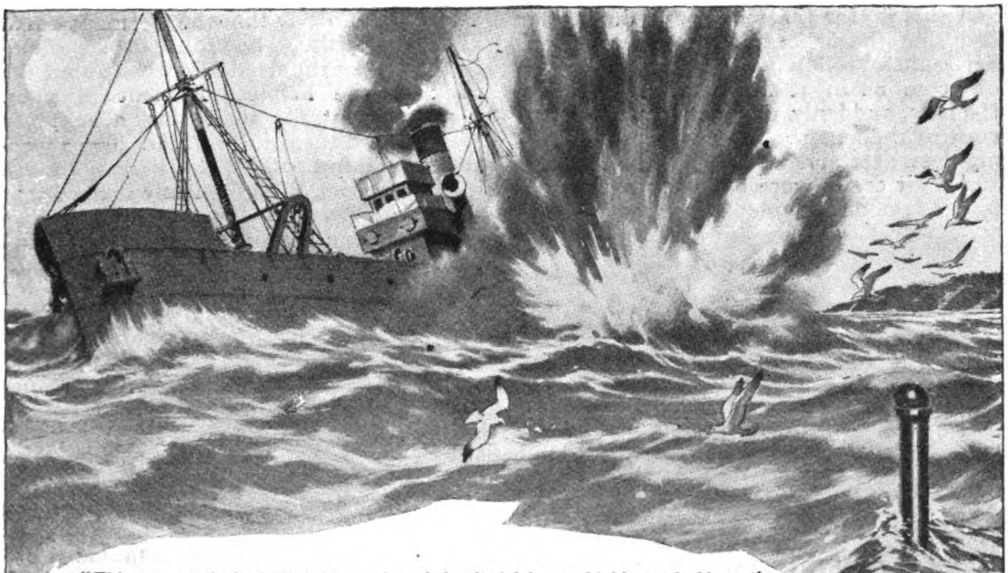
The secret was out. The sea gulls, after two years of experience, had learned that the long, dark shadow in the green depths meant food, that they had only to follow it, and sooner or later human bodies would fall to their carrion appetites. So frequent were the sinkings of steamers, the loss of lives, and the scattering of the ships' larders over the waves, that it is not at all wonderful that birds of the peculiar shrewdness that characterize all carrion species should have learned to associate the idea of food with the U-boat's appearance.

Everything about the U-boat spelled carrion, for large numbers of the submersibles themselves were destroyed by allied depth bombs and the German corpses left to float to the surface and be devoured by the hungry birds.

The sea gulls, of course, easily perceived the submarines no matter what

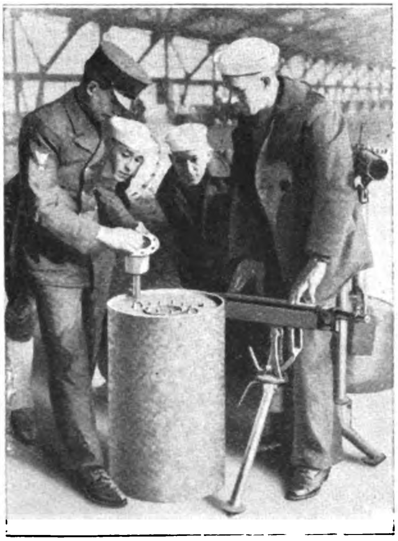


"Every day the men on the destroyers saw these trailing flocks of screaming gulls, and finally the commanding officer of one of the British patrols had an inspiration."



"This easy method of obtaining a gigantic haul of fish was highly profitable to the English, Welsh, and Scottish fishermen, and caused them to haunt the danger zones. . . . . U-Boats, suddenly rising, had these small craft at their mercy, and unless a protecting destroyer arrived quickly, the trawlers and their crews were blown to oblivion."

their depth, exactly as British and American naval airmen could detect them by virtue of the special clearness which the water assumes when seen from an elevation directly above the submerged object.



Close View of a Depth Bomb, or "Ash Can," as the Sailors Call It. These Proved to Be the U-Boats' Most Effective Foe

The depth bombs, which the seaplane fighters and the allied destroyers dropped, served to furnish the gulls with a still larger source of food, namely stunned fish. Whenever a seaplane saw a long, dark shadow, fathoms down, it wirelessed the "greyhounds of the sea," and within a few minutes the long, lean destroyers were on the job, raining depth bombs, or "ash cans," as the sailors call them, around the suspected area. These highly charged bombs were timed to explode at different depths, and scores of them were sent down in an effort to get the U-boat at all costs. The terrific explosions tore up the water furiously and brought tons of stunned fish to the surface, where they floated, belly up, at times making the top of the water, for a space a half mile in radius, snow-white and shimmering.

Upon such a feast the sea gulls fell with wild shrieks, as they had, in the majority of instances, seen the U-boat and been following its course.

In waters close to the British Isles, however, the fishermen, venturing out in steam trawlers, gave the birds battle for the fish. This easy method of obtaining a gigantic haul of fish was highly profitable to the English, Welsh, and Scottish fishermen, and caused them to haunt the danger zones, where they could, after a depth-bomb attack, get all the herring, mackerel, haddock, and cod their boats would hold, in one-tenth the time taken for trawling a like number, and incidentally, at only a fraction of the cost of using nets. Giant dippers were made by these adventurous fishermen; and the stunned fish lifted in as rapidly as the men could dip.

The British records show an extremely high rate of sinkings among the trawlers, and this is, for the most part, due to the fact that the fishermen haunted the danger zones, following the destroyers in order to be in at the death of the fish. U-boats, suddenly rising, had these small craft at their mercy, and unless a protecting destroyer arrived quickly, the trawlers and their crews were blown to oblivion.

The fact that the depth bombs exploded at various distances under the surface made the trawlers' booty much larger, since surface explosions only stunned herring and mackerel, fish that swim near the top, while deeper concussions brought cod and haddock and flat fish to the surface.

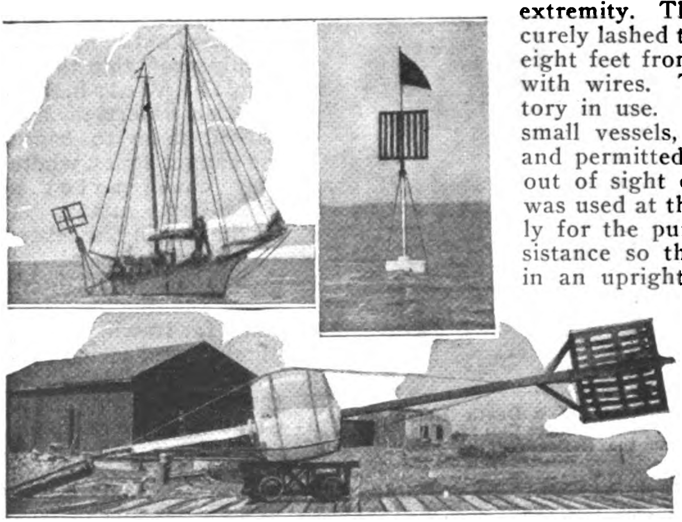
Sailors from destroyers tell of seeing gulls ravenously descending upon the boats of the fishermen, screaming and "cursing" the men who were robbing them of their rightful prey—sea carrion. At times a trawler's crew would be forced to beat off the cloud of gulls that, emboldened by hunger, flew within a few feet of the deck.

All through the last two years of the sea war, the allied forces have made highly profitable use of the gulls, setting "lookouts" to make a special study of their flights since the birds' betrayal of the "devilfish" became increasingly frequent. There was no way that the Germans could avoid the birds. The "foul" droves clung to them, like the dead albatross about the neck of the helpless Ancient Mariner, a punishment for their sins, a sentence passed upon them for murder. The superstitious fishing folk of the British shores, it is interesting to note, firmly believe that there was some supernatural connection between the carrion birds and the murderous submarines, and no amount of scientific explanation as to the ability of the birds to see into the depths will make the really simple phenomenon seem to them a natural thing.

In connection with this picturesque thing, comes the news that the fishing companies of Great Britain are preparing a bill for presentation in parliament to legalize the dynamiting of fish on the high seas, and which would employ all of the thousands of depth bombs, now useless, for this purpose. These ash cans kill or stun all fish within 200 feet, and would, the trawling firms say, bring down the cost of fish in the Isles materially, increase their number in the markets, and devote war material to a useful purpose. The number of fish in the sea is too great to be seriously lessened by this wholesale slaughter, they insist.

GEODETIC SURVEY IMPROVISES NOVEL OBSERVATION BUOY

During the summer of last year the United States Coast and Geodetic Survey, in executing some work near the westerly Florida reefs, had occasion to improvise and employ a novel type of target buoy to facilitate triangulation in open waters. A four-vaned latticed target was placed at the top of a stout 25-ft. pole and a counterweight made fast at the opposite extremity. Three sealed barrels were securely lashed to the mast, at a point about eight feet from its lower end, and braced with wires. The signal proved satisfactory in use. It was easily handled from small vessels, was visible at long range, and permitted accurate work to be done out of sight of land. The lattice target was used at the top of the mast apparently for the purpose of lessening wind resistance so that the signal would reflect in an upright position.



Floating Triangulation Target Used by Geodetic Survey: Extreme Left, being Launched from Schooner; Middle, in Service; Below, Showing Details of Construction

ℭAccording to a new ruling, officers and men of the army who were not fortunate enough to get to France or other fighting fronts are entitled to wear a service chevron of silver, similar to the gold one authorized for oversea service.

NEW NAVAL DIRIGIBLE IN LONG FLIGHT

A few weeks ago one of the United States Navy's new twin-engine dirigible balloons made a journey of 315 miles without mishap, in 13 hr. 13 min. of flying, thereby indicating the splendid advancement which has been made by our sea forces in this important line of activity.

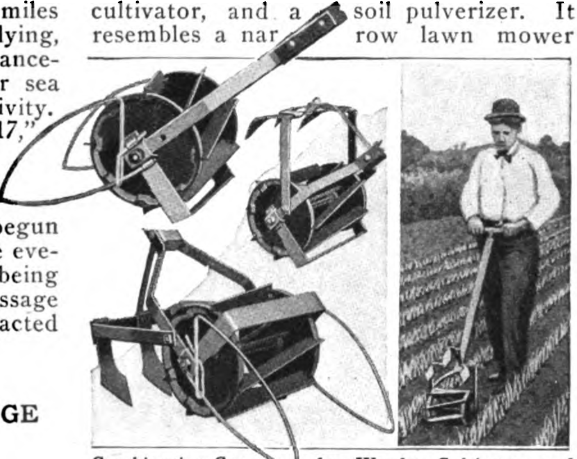
The dirigible is known as the "D-17," and traveled from Akron, Ohio, where it was built, to the naval air station at Rockaway, N. Y., with a crew of six men. The flight was begun at 1:10 a. m. and concluded the same evening at 6:30, a stop of a few hours being made at Washington, D. C. The passage of the big craft through the air attracted more than usual interest.

CENTURY-OLD MAINE BRIDGE STILL IN USE

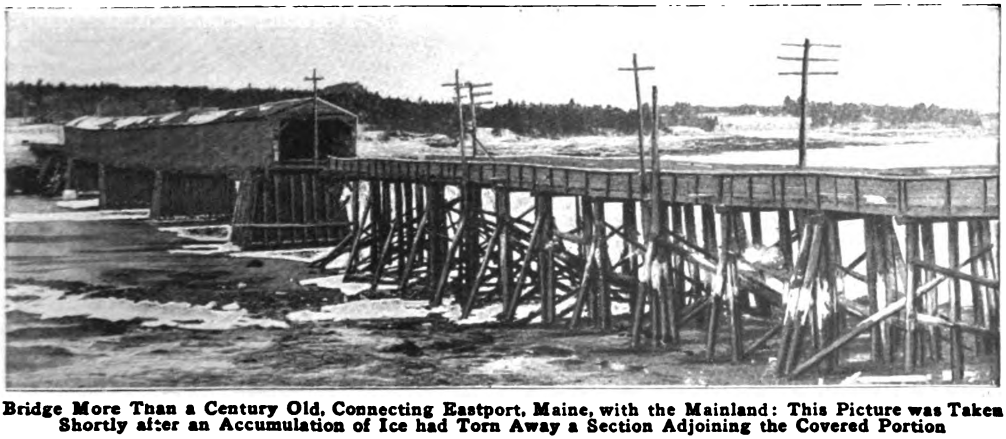
A structure, well illustrating bridge building as it was carried on a hundred years ago, is the 1,800-ft. wooden bridge connecting Eastport, Me., the easternmost city in the United States, with the mainland. Though more than a century old, the bridge is still in service, and, until about two years ago, a toll was exacted of its users, it being one of the last Maine bridges to be opened to the free use of all. Because the tide at this point rises 22 ft. or more, the floor is supported on high piers and piles. In recent years the cost of repairing the old structure has been heavy. Last winter, when the cold was unusually severe, ice tore away a 75-ft. section, and the principal highway to Eastport was closed for a period of several days.

THREE GARDEN IMPLEMENTS COMBINED IN ONE

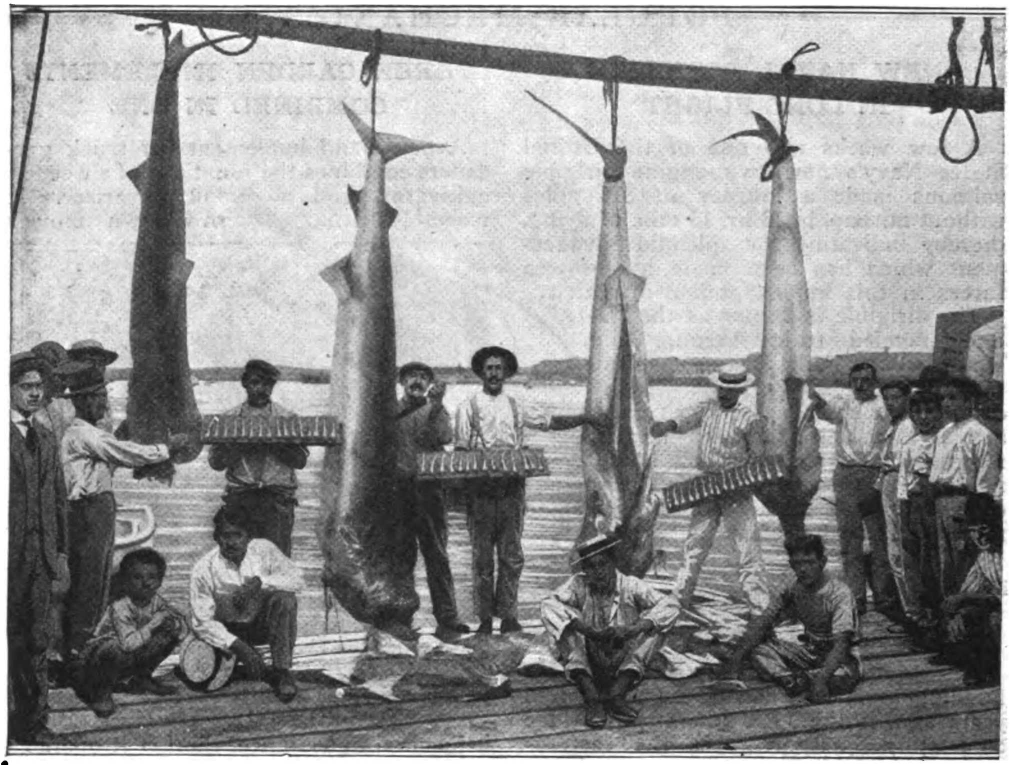
A new hand implement for truck gardeners combines the functions of a weeder, cultivator, and a soil pulverizer. It resembles a narrow lawn mower in general appearance, though it operates differently. Extending from one rim to the other of its two solid wheels is a series of blades that break up the soil as they revolve, while immediately back of the wheels is a horizontal blade, which cuts off the roots just below the surface. By swinging the handle on its pivots so that it is in a position for pushing the wheels in the opposite direction, a set of tines is brought into position for deeper cultivating. On either side, projecting forward, is a wire guard which slides along the ground, pushing the leaves of the plants back, or lifting them up, so that they are unharmed by the implement.



Combination Garden Weeder, Cultivator, and Pulverizer: Upper Left-Hand View Shows Leaf Guards in Position; Center View Shows Tines Upraised, with Horizontal Blade in Position, While Below Tines Are Ready for Cultivating



Bridge More Than a Century Old, Connecting Eastport, Maine, with the Mainland: This Picture was Taken Shortly after an Accumulation of Ice had Torn Away a Section Adjoining the Covered Portion



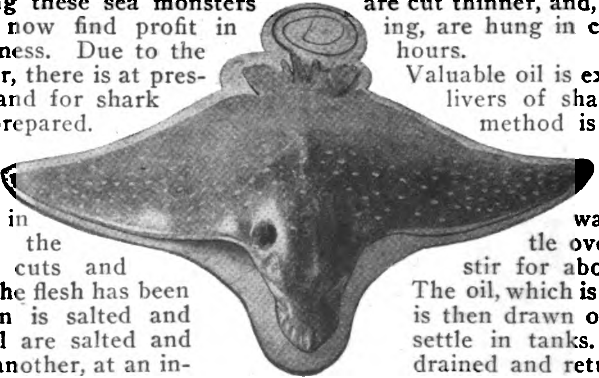
A Fine Catch of Sharks Made near Havana, Cuba: On the Boards Which Three of the Men are Holding are Displayed the Young Found in the Big Fishes. The Cubans are Learning That Valuable Hides, Steaks, and Oil can be Obtained from These Sea Monsters

SHARK FISHERS ENJOY INCREASED PROFITS

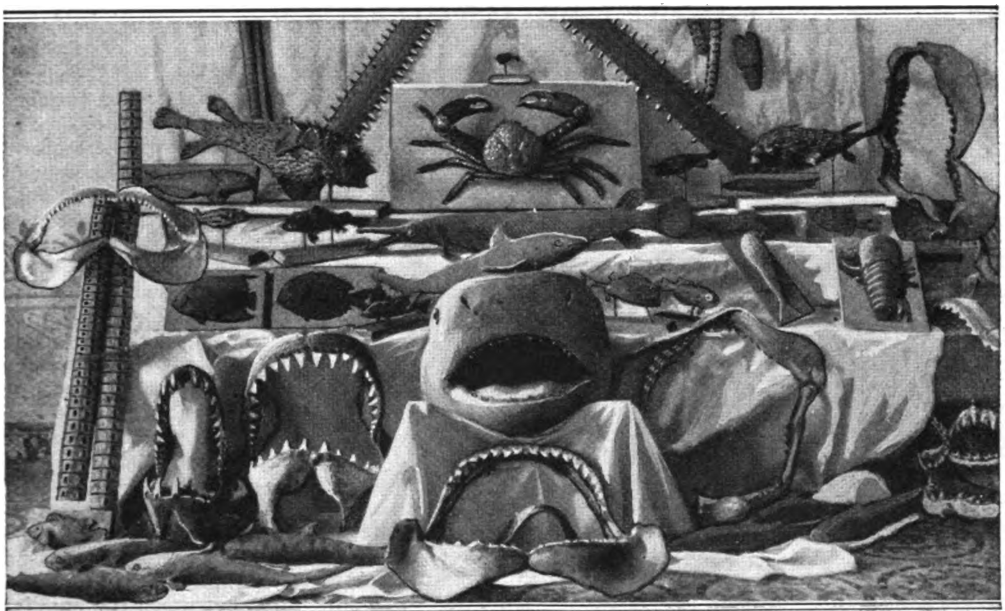
The new values which the war has given to various products obtained from sharks, have produced unusual activity among shark fishers, while many who once engaged in catching these sea monsters only for sport, now find profit in making it a business. Due to the scarcity of leather, there is at present a large demand for shark hides, properly prepared. The whole skin, minus that on the head and tail, is removed in one piece with the fewest possible cuts and holes. After all the flesh has been cut off, the skin is salted and rolled, or several are salted and laid flat, one on another, at an incline, to allow the brine to drain off. After proper curing, they are packed in boxes or barrels for shipment.

There is a good market also for smoked shark meat, the raw meat being first cut in suitable strips. For hot smoking, after treatment in brine, the pieces are put in a sling and hung for four hours above a low fire, and then for about two hours in the smoke of a smothered fire, for coloring. For cold smoking, the strips are cut thinner, and, after proper curing, are hung in cold smoke for 48 hours.

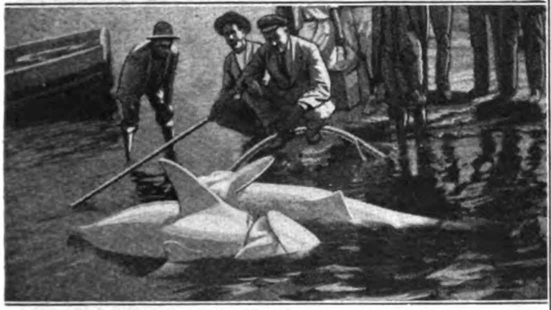
Valuable oil is extracted from the livers of sharks. A common method is to chop the organs into small pieces, place them in a water-jacketed kettle over a low fire, and stir for about half an hour. The oil, which is of the best grade, is then drawn off and allowed to settle in tanks. The residue is drained and returned to the kettle for a second rendering, while the refuse obtained from this process is dried and sold as fertilizer. For some time material of this sort has been widely used in many European countries and is now beginning to find a growing market in the United States.



One of a Family Related to Sharks and Variously Called Devilfish, Sea Devil, and Eagle Rays



A Rather Terrifying Collection of Specimens from Tropical Waters, Including a Shark's Head, Several Varieties of Sharks' Jaws, and Swords from Swordfish

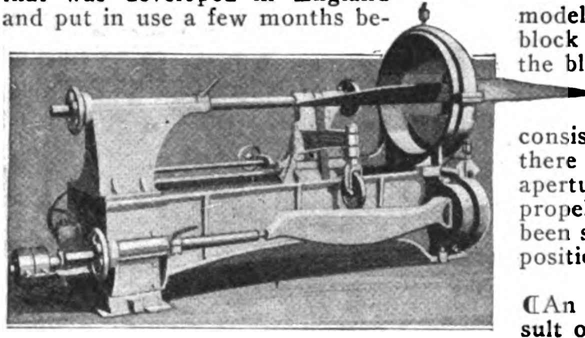


"Bringing Home the Bacon," in This Case, Is Two Carcasses of Ocean Monsters from Which Valuable Hides and Other Products can be Obtained

From Sharks Like These Oil for Adulterating Cod-Liver Oil and for Other Purposes is Sometimes Obtained

A Partly Dressed Shark Carcass from Which the Viscera have been Withdrawn: Portions of the Latter, Including the Liver, are Chopped into Small Pieces and an Oil of Good Quality is Obtained by Proper Heating

PROPELLER-CUTTING MACHINE IS LIKE COPYING LATHE



BY COURTESY OF ENGINEERING, LONDON

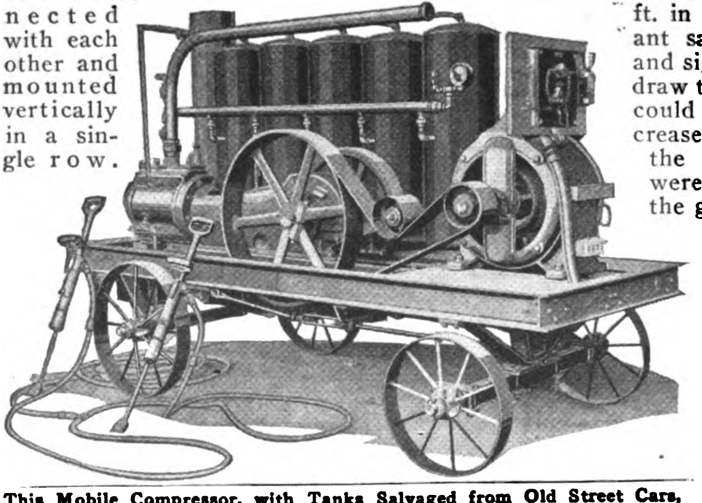
The Movement of the Cutter Block is Guided by the Roller, Visible at the Side, Which Travels on the Model

Excellent work is said to be accomplished by a propeller-shaping machine that was developed in England and put in use a few months before the end of the war. Essentially the apparatus is a modified copying lathe. Propellers turned out by it are so well finished that they need only to be touched up with sandpaper, it is claimed. The centers that hold the blank and the model are geared so as to rotate at like speeds. A wheel-shaped roller travels on the model, following its lines, while a cutter block of corresponding size operates on the blank, shaping it. The two members are mounted on a swinging angle bracket. The driving headstock consists of a large bearing within which there is a rotating flanged disk with an aperture through which one-half of the propeller projects. When one blade has been shaped, the blank is removed and its position reversed.

¶An unexpected and rather amusing result of the use of gas at the front is the fact that coins carried by those in gassed regions were turned black by the fumes, and later many shopkeepers in the smaller French villages steadfastly refused to accept them.

USE STREET CARS' AIR TANKS IN BUILDING COMPRESSOR

In one of the western cities a surface-traction company is using a portable air compressor that is of rather novel construction. Instead of having one large tank, it has a series of five small ones, salvaged from old street cars. The cylinders are connected with each other and mounted vertically in a single row. A large motor, mounted at one end of the all-steel truck that carries the equipment, drives the compressor.



This Mobile Compressor, with Tanks Salvaged from Old Street Cars, Supplies Air for Pneumatic Tools Used by Repair and Construction Gangs

BALLOONIST HAS THRILLING RACE TOWARD THE SEA

Caught in the teeth of a violent gale, a lieutenant in an army balloon school in California not long ago had the thrilling experience of being hurried over the mountains toward the Pacific at altitudes ranging as high as 10,000 ft. The balloon was anchored for observation work 2,500 ft. in the air when the lieutenant saw a storm approaching, and signaled the ground crew to draw the bag down. Before this could be done, the wind had increased alarmingly, and when the basket and its occupant were within about 100 feet of the ground, the cable snapped. Instantly the balloon shot upward, and was soon 9,000 or 10,000 ft. high, and at the same time was racing toward the sea. A few moments later, too much gas having escaped, the bag dropped 4,000 ft. in about two minutes. Still in danger of drifting to sea, the balloonist leaped overboard with his parachute, dropping, unharmed, into a tomato patch, while the balloon, in which he had ripped a gash, landed at the opposite end of the field.

REVIVAL OF BROOM MAKING IN THE SOUTH

In many parts of the South where crop rotation is being tried, the raising of broom corn is being introduced. It has been found that in Florida, Alabama, Mississippi, Louisiana, and Tennessee both the soil and climate are suited to it. The attention of planters is being called to the fact that no great skill is required to work up the raw material into brooms — a task to which boys and girls as well as adults can devote their leisure hours. It is claimed that a broom-corn crop handled in this way is more profitable to the grower than cotton, even at the present high prices which the latter commodity now commands.

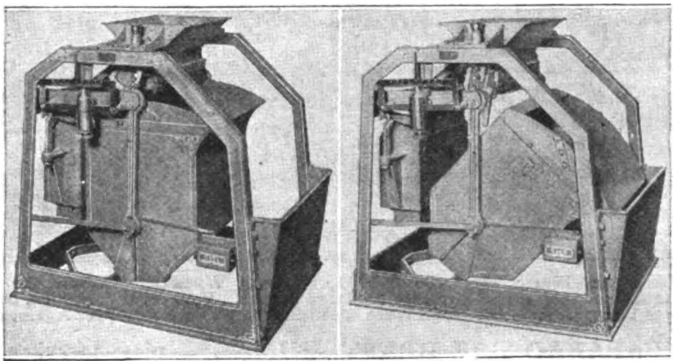
PHOTOGRAPHER IS AIDED BY PHONOGRAPH

A photographer has found a phonograph a valuable aid in obtaining the desired facial expression in a subject. After studying the face of the person whose likeness he is to obtain he decides whether he wishes an animated, reserved, sad, or pensive expression. He then places a record in the phonograph likely to stimulate the expression desired. For animation he will play such a tune as "Dixie," while to produce a sad or thoughtful expression "My Old Kentucky Home" may be played.

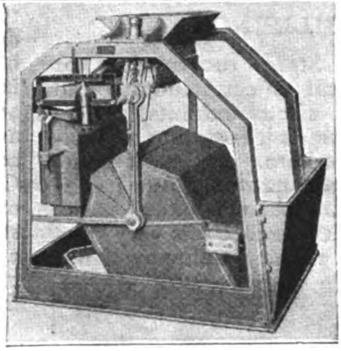
AUSTRALIA SEEKS AMERICAN AFTER-WAR TRADE

Australia has recently sent a commercial envoy to the United States thereby establishing a new precedent, the custom in the past having been for the mother country to look after international interests of the British empire. But the commonwealth on the far side of the world has large stores of wool, wheat, meat, etc., for much of which new customers must be found. In the past Germany has been a large purchaser of these materials but Australians are averse to patronage from that country hereafter. The new representative has made his headquarters in New York.

SCALE WEIGHS AND DUMPS GRAIN AUTOMATICALLY



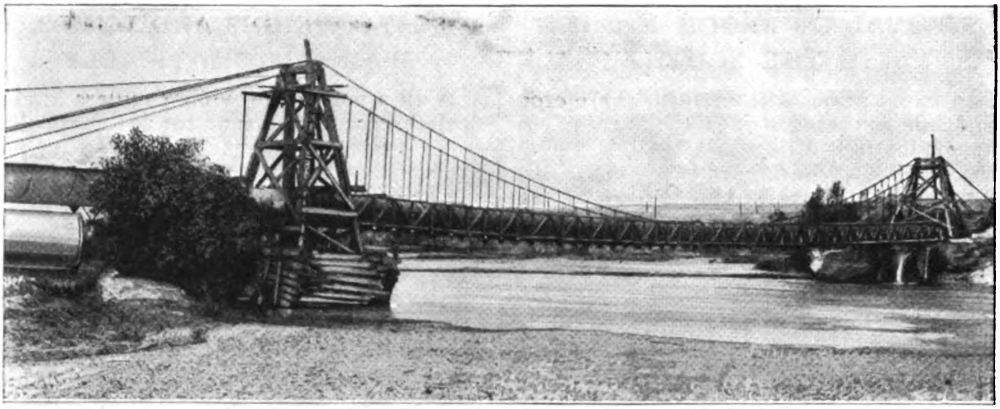
Above, at Left, the Bucket is Ready to be Filled. At the Right, It has Just been Tipped and is Swinging into Position for Emptying



Grain Scale Which Weighs and Dumps Automatically: Here the Bucket has Just Discharged Its Contents

With a view to providing millers, grain dealers, etc., with means for automatically and rapidly weighing grain as it is being loaded from one container to another, an automatic scale has been devised which has a number of interesting features. The grain flows from the chute into the metal bucket, which is hung from a scale beam mounted in a suitable metal frame. The bucket is balanced with a weight equivalent to the number of bushels of grain which the former will hold, and when it is full, it is tripped automatically, swings over, and discharges into the bin below. At this point the flow of grain is shut off. A movable weight, on an auxiliary scale beam, is provided, by which allowance is made for grain that reaches the bucket after the chute has been closed. On emptying itself, the bucket returns to an upright position and the operation is repeated.

¶Two years of prospecting by a geologist and explorer has established rather definitely the location of extensive lands, tributary to the new Alaska railroad, from which it is expected that platinum can be mined profitably.



Irrigation Flume over the Big Horn River, Wyoming: When the Stream Undermined the Original Aqueduct, Engineers Hurriedly Replaced It with a Four-Foot Iron Pipe, but This Fell into the River Just as It was being Completed. The Work Then had to be Done All Over Again, a Wooden Flume being Substituted

CARABAO THE DRAFT ANIMAL OF FILIPINOS

In the United States the carabao, or water buffalo, is an object seldom found outside zoos and circus exhibits, but in the Philippine Islands it is nearly as common as horses are here. In fact, it is the draft animal of the natives. But it differs from horses, and even oxen, which it slightly resembles, in that it is very fond of the water and is most unhappy if not allowed to spend some time each day in a pool or stream.

Stream in the Philippines Showing Three Water Buffalo Enjoying Their Daily Swim

IRRIGATED TRACT THREATENED BY TWOFOLD MISFORTUNE

One misfortune following on the heels of another threatened the destruction of crops on 12,000 acres of Wyoming land last summer, and twice destroyed a vital part of a large irrigation system. The first mishap occurred when the swollen Big Horn River undermined one of the piers carrying a 250-ft. irrigation pipe over the stream. To save the fields from drought, engineers hastily assembled cables, 4-ft. iron pipe, etc., and after throwing a structure like a suspension bridge across the channel, laid the pipe on it. In a month, the work was practically finished, and then the second misfortune came. One of the supporting towers toppled over, hurling the whole aqueduct into the stream. Then a 48-in. wood-stave flume was built and suspended from the cables, and soon water was flowing onto the fields.

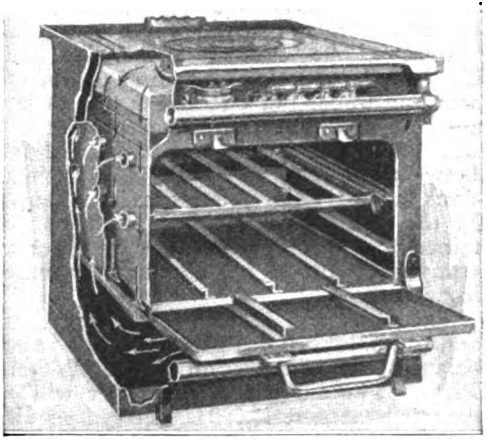
HOW BRITISH STRATEGY KEPT SUEZ CANAL OPEN

That there are some things in the science of strategy not taught in the war colleges, is illustrated by Great Britain's defense of the Suez Canal, the facts of which have recently been made public. When the allies in Flanders were hard pressed, it was necessary to summon the two strong divisions stationed at the canal, and their place was taken by three hastily mobilized brigades from India. This small force faced the whole Turkish Syrian army, staffed by Germans, while behind it was the Egyptian population threatening trouble.

In an article in the Philadelphia North American, Maj. Gen. Sir George Younghusband tells how small redoubts were built every two or three miles on the east bank, while covering the intervals, on the west bank, were trenches. The British officer in command, though not deeply learned in higher strategy, performed his task with rare skill. The ingenious, if unconventional, means used to detect the approach of enemy scouting parties to the canal, consisted in daily making a broad, smooth mark beside it, in the sand, by drawing a timber along, wrapped in sacking. This mark was kept intact the whole length of the waterway, and repeatedly it enabled the watchful guards to discover tracks made at night by would-be mine layers. All told, 16 mines designed to blow up passing boats, and so block traffic, were found and rendered harmless. By such means the small force kept the waterway open for a whole year, without serious mishap.

TRIPLE-WALL HOTEL RANGE HEATED ECONOMICALLY

A new hotel gas range, it is claimed, requires a relatively small amount of fuel because of its special design, which causes much of the heat from the upper, as well as the lower, burners to pass around the oven before reaching the flue. In addition to an outer casing inclosing the oven, there is an intermediate wall with vents leading from it to the interior of the oven. The burners above the baking chamber, employed to heat the top of the stove, are so placed that air heated by them passes down the sides of the oven, between it and the intermediate wall, while heated air from the burners below passes upward between the outer and intermediate walls, entering the baking chamber through the vents.



Sectional View of New Hotel Gas Range: Black Arrows Show How Heat from Upper Burners Circulates around the Oven, While the White Arrows Indicate How the Heat from the Lower Burners Enters the Oven

GREAT NIAGARA POWER PROJECT UNDER WAY

Quietly and without formality the Hydro-Electric Power Commission of Ontario has begun work on one of the greatest power projects yet undertaken at Niagara Falls. The work, when completed, will permit a great extension of the commission's low-priced current service. The plant for which a new canal is being dug will produce 300,000 hp., or nearly half, it is said, of the present output of current from both sides of the river, combined. Eventually the new project, which will be completed about

Loading Dirt Cars Placed along the Brink of the New Canal: By 1921 Some 11,000,000 Cubic Yards of Earth and 4,000,000 Cubic Yards of Rock will have been Excavated

The Beginning of a 12-Mile Canal Extending around Niagara Falls, Which Is Part of a Project to Develop 300,000 Horsepower at a New Plant below the Cataract

1921, may be expanded to produce 1,000,000 horsepower.

What is here being undertaken for the first time by any Canadian agency is the utilization of almost the whole of the fall between Lake Ontario and Lake Erie. Two of the existing Canadian plants are working under net effective heads of less than 135 ft., while the proposed plant will use a head of 305 ft. out of a total fall between the lakes of 330 ft. The tremendous advantage of this increase is shown by the fact that about 30 hp. will be obtained from each second-foot of water as compared with 14 hp. obtained by existing plants.

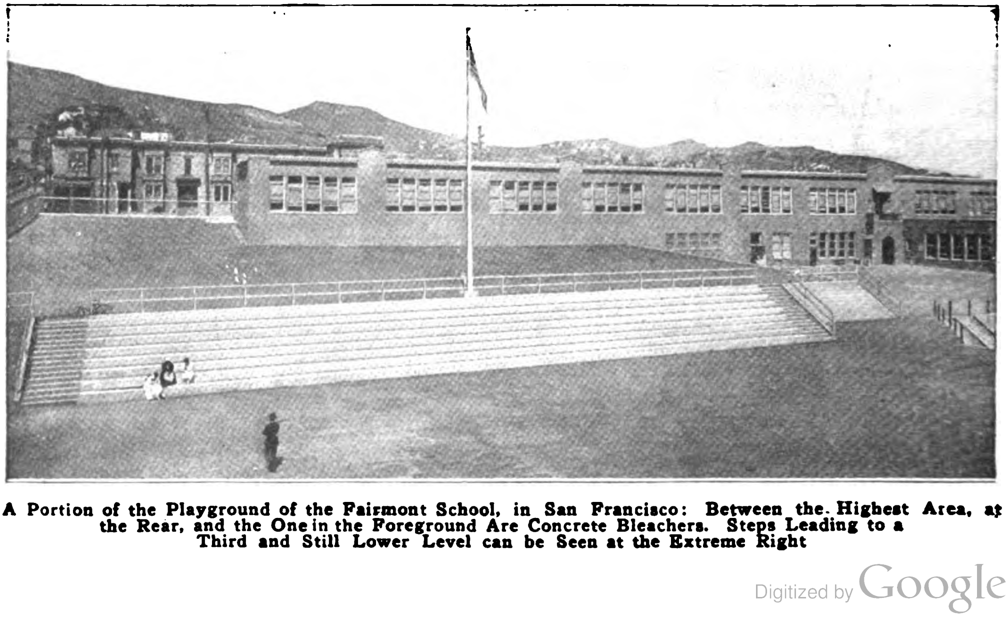
The canal will be 12¾ miles long, four and one-fourth miles of which will be an enlargement of a section of the Welland River. The current of the latter will be reversed. About 15,000,000 cu. yd. of dirt and rock will be excavated. The cliffs are nearly vertical at the power-house site, so that the penstocks will lie at a very steep angle, and will be only 450 ft. long—a fact that reduces the cost of construction. The turbines, the engineers state, will have the greatest capacity of any water turbines yet designed.

SLOPING SCHOOL YARD MADE LEVEL IN NOVEL MANNER

The location of the Fairmont school, in San Francisco, on a steep hillside, made it particularly difficult to provide a satisfactory playground. Formerly the entire slope was boarded over. With the erection of new buildings, however, the ground was terraced and graded at three different levels. Concrete steps now connect the three areas, and between the highest and the adjoining level the retaining wall has been so made that it can be used as bleachers when the lower area serves as an athletic field.

TRAINING DEPARTMENT HELPS FACTORY'S OUTPUT

A concern which has been engaged in an essential war industry has given a demonstration of the value of a well-conducted training department for its employes, its experience proving that such a department increases the output and reduces the annual labor turnover. In many respects, what was done in this plant would serve as a model for other factories. The training section occupies a separate room and is in charge of competent instructors, taken for the most part from the production departments. The hours are the same as in the rest of the plant, the raw material worked on is the same, but the wages are lower, with the understanding that as soon as the pupil is worthy of promotion the wage will be increased. Most of the employes in this plant are women, and they are all required to wear a two-piece uniform. High-heel shoes and silk stockings are condemned, and wearing of jewelry is not permitted. On the average, learners stay with the training department about a week.

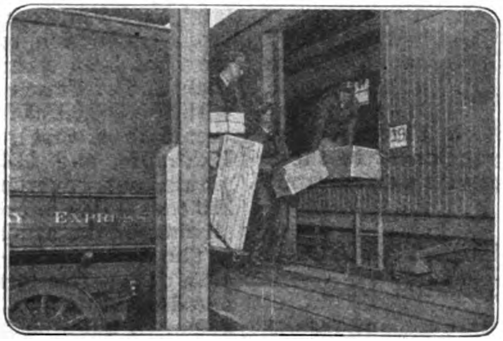


A Portion of the Playground of the Fairmont School, in San Francisco: Between the Highest Area, at the Rear, and the One in the Foreground Are Concrete Bleachers. Steps Leading to a Third and Still Lower Level can be Seen at the Extreme Right

EFFICIENT EXPRESS-HANDLING SYSTEM ADOPTED

Giving the Container Its Car Number upon Delivery at the Terminal for Billing

The Box is Placed with Other Similarly Labeled Ones in Compartment Number 39



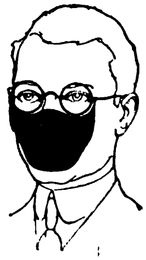
Confusion is Eliminated and Efficiency Promoted, for Car 39 is Not Visited by a Half Dozen Different Wagons

To facilitate the handling of express matter, a new system of routing has been instituted at terminals in large cities since unified operation was effected by the government. The facilities of cars available on different routes have been tabulated and each carrier given a number. When a package, for instance, is delivered at a terminal for billing, the number of the car in which it is to be placed is marked on it. Subsequently it is taken to a storage compartment bearing the same number. It is then a simple matter for relay wagons or trucks to transfer it, with other matter in the same bin, to the proper car. The method obviates inefficiency by abolishing a condition that formerly resulted in several wagons making trips to the same car. Likewise it lessens the difficulty of breaking in new men who might cause misrouting or loss of shipments.

GERMANS BUILDING BIG PLANE FOR TRANSATLANTIC FLIGHT

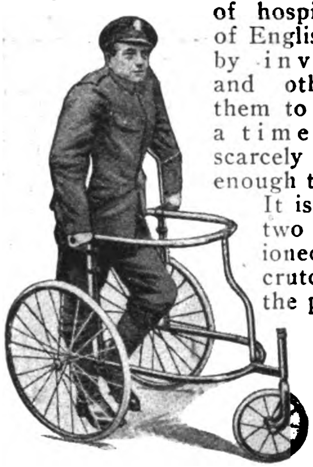
While Americans, Britishers, and Italians have been making plans for big aeroplanes of 5,000 and, in one instance, 18,000 hp., with which to cross the Atlantic, the Germans have not been idle. It is reported that even before the signing of the armistice they had begun the construction of a mammoth plane of 3,000 hp. and a wing spread of 198 ft. According to the same authority, an airship is also being built for transatlantic flying, which will be equipped with nine engines driving eight propellers, and will be able to carry 100 passengers. A flight in this machine is contemplated for some time in July.

PATENT FACE MASK PROTECTS WEARER AGAINST DISEASE



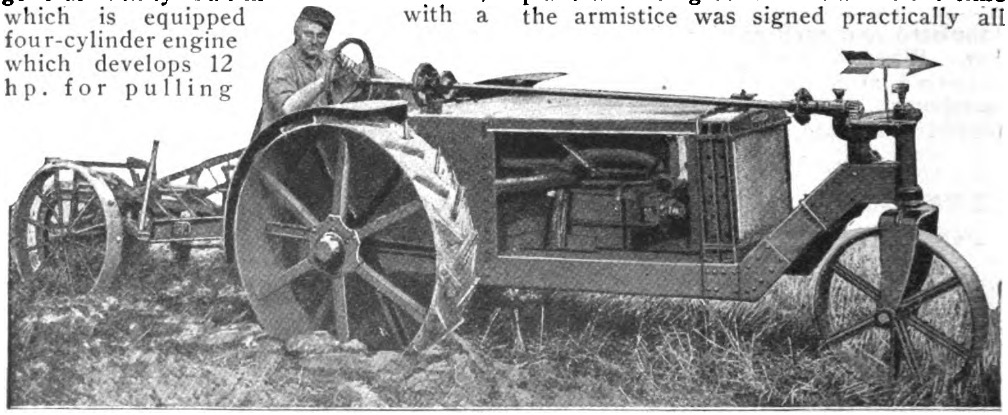
Of special interest because of the prevalence of influenza this winter, is a recently patented face mask. The mask proper consists of a wire frame, bent to fit snugly to the face and covered with extremely fine-mesh wire gauze. This protector is held in front of the nose and mouth by being attached to the bows of a pair of spectacles, the lenses of which are extra large in order that the eyes may be well shielded. The device is one that can be put on or removed easily.

WHEELED OUTFIT HELPS INVALIDS TO WALK



A walking machine for persons recovering from illness, or wounds, is a piece of hospital equipment of English make in use by invalid soldiers and others, enabling them to walk about at a time when they scarcely have strength enough to use crutches. It is provided with two uprights, fashioned somewhat like crutches, on which the patient rests, at the same time grasping handles at either side. These supports are attached to a U-shaped steel frame mounted on three wheels, similar in size and arrangement to those of a child's velocipede with a small front wheel.

NEW THREE-WHEEL TRACTOR FOR GENERAL FARM USE



New Three-Wheel Farm Tractor Suited for a Variety of Uses; It is Intended to Handle Two 14-Inch Plows under Any Conditions. It Has a Wheel Base of 86 Inches and Weighs 3,200 Pounds

In recent severe tests excellent results have been obtained with a new three-wheel general-utility farm tractor, which is equipped with a four-cylinder engine which develops 12 hp. for pulling and 25 hp. for driving a belt. It has a turning radius of 8 ft. and travels at a rate of from one and three-fourths to five miles per hour, depending on whether high or low speed is used. Recently the machine, drawing two 14-in. plows, plowed four and one-half acres of clay soil at the unusual depth of 9 in. in less than six hours, using 11 gal. of fuel. It also furnished power for filling a 60-ton silo, with a fuel consumption of only 10 gallons.

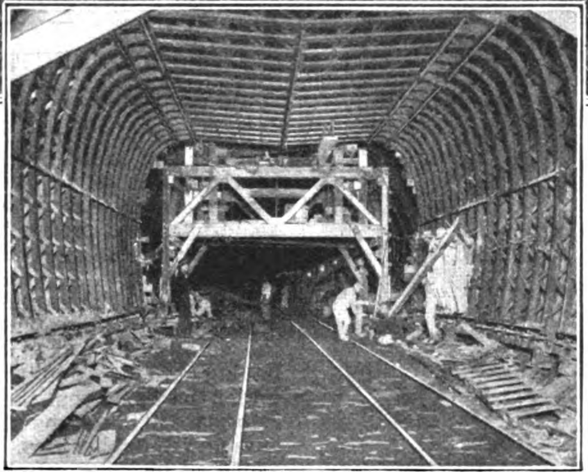
AMERICA PREPARED FOR GAS WARFARE ON VAST SCALE

A phase of America's war preparation, more appalling in its possibilities than anything which the fighting nations experienced, is revealed in the story of this country's manufacture of poison gas, now made public. When at last America, with great reluctance, adopted gas as a war weapon, that it might defeat the Huns who had instituted the fiendish practice, it set out to produce the deadly substances on a greater scale than Germany, England, and France combined. The maximum production of the first two countries has been estimated at 30 tons daily, each, and of France at a less amount. But with the $60,000,000 the United States invested in a vast poison gas plant near Baltimore, and $12,000,000 in subsidiary plants, our government was turning out 200 tons a day in the weeks preceding the signing of the armistice.

The human mind cannot grasp the possible destructive power of this output, for one drop of the gas, properly placed, is sufficient to kill a person. Much of the machinery used had to be invented while the plant was being constructed. At the time the armistice was signed practically all equipment was built and tested for carrying one-ton consignments of the most deadly gas by aeroplane over such cities as Metz and dropping it on the fortifications. One such charge, it is said, would have been sufficient to kill every living thing in an acre tract.

PORTABLE STAGING TRANSFERS STEEL TUNNEL FORMS

Back of the Sign of the Top Picture, Visible at the Left are Shown Disassembled Sections of One of the Forms



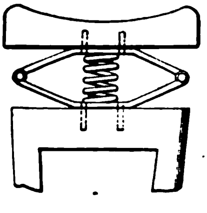
The Lower Photograph Gives a View of the Staging After the Forms have been Raised and Bolted in Place, for the Concrete to be Poured

Quite an ingenious method is being applied to save labor in moving the heavy steel forms, used in reinforced - concrete tunnel construction, from one position to another. After the concrete, forced behind the steel supporting structure by compressed air, has set, a large, heavy timber staging, mounted on wheels, is moved into position. The forms, instead of being entirely disassembled, are merely unbolted along the center line at the top. The two halves, each of which is hinged at the "bilge," are collapsed so that their weight is borne by the staging. The latter is moved forward to the next section to be concreted. The forms are raised and bolted. All is then ready for pouring the concrete.

PRESSURES INCREASED BY ELECTROLYSIS

By utilizing the well-known ability of electricity to cause water to decompose, engineers have been able to obtain hydraulic pressures that are remarkable. One ampere of current in one hour will decompose sufficient water to produce something like a pint of hydrogen and half a pint of oxygen. That the presence of these gases, confined, would produce greatly increased pressures, is not difficult to imagine. One man claims to have produced pressures as high as 1,860 atmospheres by this process which possesses many interesting engineering possibilities.

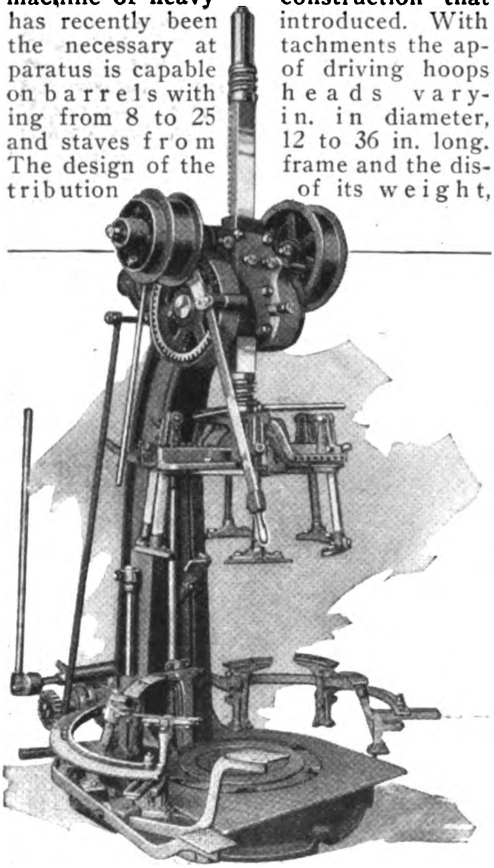
RESILIENT CRUTCH ADDS TO USER'S COMFORT



A simple improvement in a crutch, designed to give added comfort to the user, consists of two springs placed immediately below the curved portion on which the armpit rests. This gives the crutch a resiliency not possessed by others, and also tends to lengthen the stride of the user without additional effort on his part.

NEW BARREL-HOOP REDRIVER WITH GOOD CAPACITY

Of possible interest to coopers is a high-speed trussing- and hoop-redriving machine of heavy construction that has recently been introduced. With the necessary attachments the apparatus is capable of driving hoops on barrels with heads varying from 8 to 25 in. in diameter, and staves from 12 to 36 in. long. The design of the frame and the distribution of its weight, which amounts to 4,600 lb., are such as to resist strains and practically eliminate vibrations. The bottom-bilge hoop-drivers are carried on curved arms that open automatically to receive a barrel. The members are closed by a foot lever, which releases the supporting ring and causes the barrel to be raised so that the drivers engage properly. When used for trussing, a special set of cones is needed for each size of barrel. The double-end machine has a capacity of from 1,500 to 2,000 barrels.



The Broad Base of the Machine Provides Ample Support without the Usual Foundation

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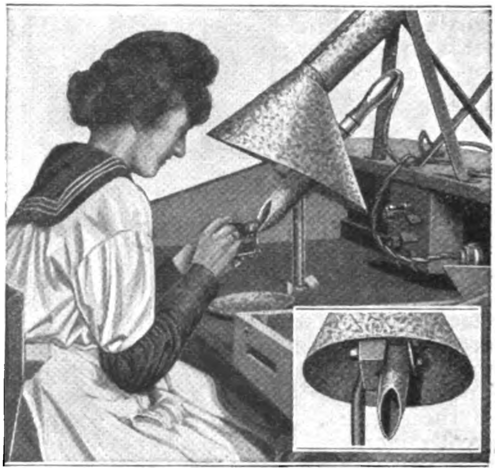
¶ A reminder of the great part which Russia played in the war despite final misfortune, is found in the statement that its casualties totaled 8,000,000 men, of whom 3,000,000 were killed.

USE OF POLICE WIRELESS SAVES MANY LIVES

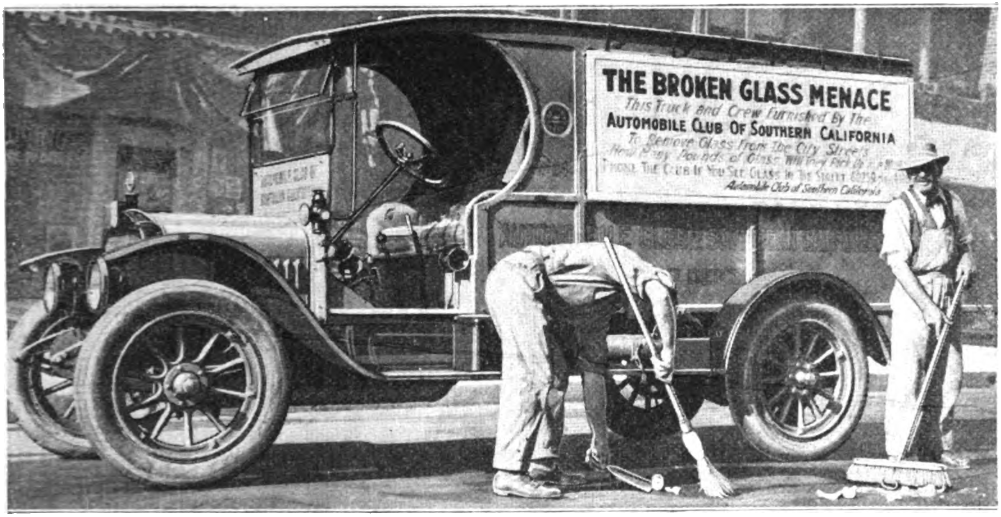
The important part wireless telegraphy is playing in the activities of the New York City police is shown in a recent report covering the past two years. As a result of messages sent from the roof of the police headquarters to the police patrol, 25 lives were saved and $400,000 worth of merchandise was rescued, when river craft, on account of accident, drifted helplessly in the lower bay and in Long Island Sound. The police-radio outfit, which handled 2,000 messages in the period indicated, is able to receive dispatches from a distance of 1,500 miles and has a sending radius of 300 miles.

WAX FOR ELECTRIC FIXTURES MELTED WITH SOLDER IRON

For covering countersunk screws with sealing wax and filling other depressions in the bases of small wiring devices, a manufacturer uses a number of electric soldering irons mounted at an incline on brackets. Leading down to the tip of each iron is a groove into which the worker places the end of a stick of sealing wax, holding it just long enough to melt the amount of wax needed. The article having a depression to be filled is held under the tip so that the melted wax drips into place. The irons used are of the type having removable tips. A metal hood is provided to carry off the fumes from the melted wax.



Electric Soldering Iron with Grooved Tip, Melting Sealing Wax, Which is Used to Fill Depressions in Electric Fixtures. The Metal Hood is Provided to Carry Off the Fumes


THE BROKEN GLASS MENACE
This Truck and Crew Furnished By The
AUTOMOBILE CLUB OF SOUTHERN CALIFORNIA
To Remove Glass From The City Streets
Phone The Club If You See Glass In The Street

In One Week, 186 Pounds of Broken Glass were Removed from Los Angeles Thoroughfares. The Picture Shows How It was Done

MOTOR-CAR CLUB CAMPAIGNS AGAINST BROKEN GLASS

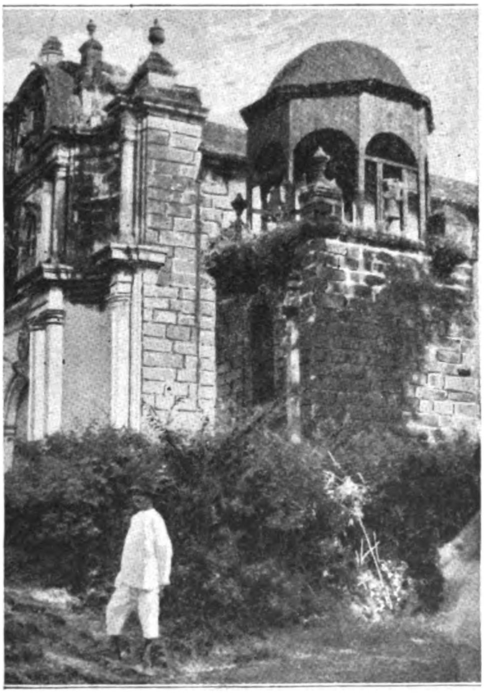
One hundred and eighty-six pounds of broken glass were removed from the streets of Los Angeles in one week by a two-man crew assigned to a truck owned by the Automobile Club of Southern California. The machine, conspicuously placarded, was sent out largely for the purpose of calling public attention to a condition that menaces motorists the world over. It traveled 815 miles in collecting its by no means small cargo. Although this activity was merely a temporary one, the club makes a practice of removing glass, day or night, from the city streets in response to reports made by telephone.

FLIGHT TO EAST AFRICA STARTED BY ZEPPELIN

Information regarding a remarkable flight of a German Zeppelin has recently been reported by a British correspondent, who learned the facts since the coming of peace. A German airship, it is said, left Bulgaria carrying a crew of 22 men, tons of munitions, and medical supplies, bound for German East Africa, which is approximately 3,000 miles from Bulgaria. According to the account, while the ship was flying over Khartum, it received a wireless message ordering it to return, the Germans having learned that the majority of their troops in their African territory had surrendered.

PHILIPPINE CHURCH HAS SEPARATE BELFRY

In the Philippines a belfry is usually built separate from the church, as shown in the accompanying photograph. Earth-

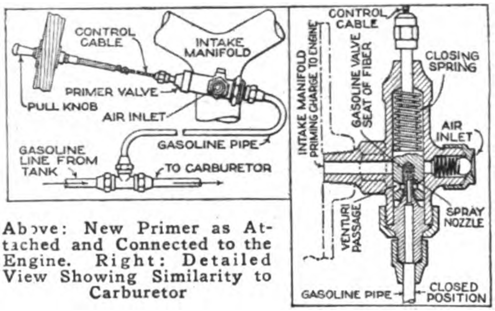


A Picturesque Church near Manila, Philippine Islands, with a Separate Structure for a Belfry: This Arrangement Is Not Uncommon as a Safeguard against Accidents Due to Earthquakes

quakes are not infrequent in the islands, and this precaution is taken in order that a tremor may not send the bell crashing down through the roof.

AUTOMOBILE-ENGINE PRIMER MADE LIKE CARBURETOR

Among the several primers introduced for the use of motorists who experience difficulty in starting cold engines with low-grade fuel, there is one that is constructed on the carburetor principle. It is attached to the intake pipe, connected with the gasoline line back of the carburetor, and operates only when the motor is being "turned over," thereby obviating, it is asserted, the common danger of condensation. Gasoline enters the air passage at the choke point and is drawn into the engine at high velocity, aerated and atomized. The priming charge flows steadily in sufficient volume to turn the engine without gas being drawn through the carburetor. Among the broad claims of merit made for the device is the contention that a stone-cold motor can ordinarily be started in two or three turns.



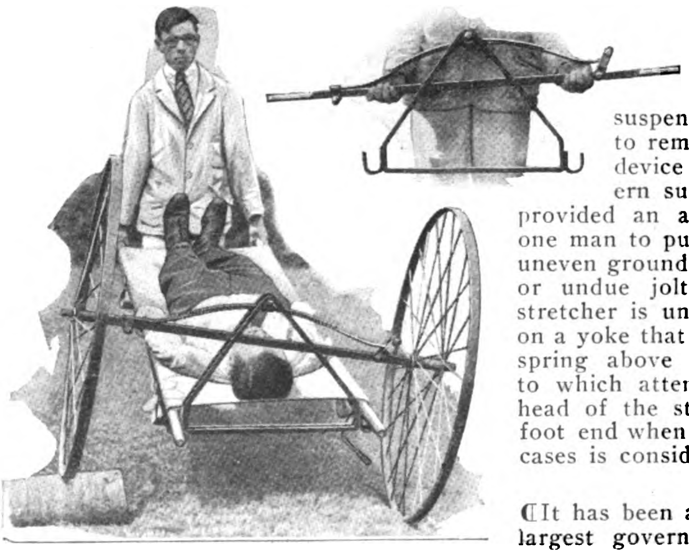
Above: New Primer as Attached and Connected to the Engine. Right: Detailed View Showing Similarity to Carburetor

FIGURES TELL BRITISH LOSS ON THE SEAS

In a few figures which were recently given out by the British Admiralty are summarized the sea tragedies which have saddened tens of thousands of British homes—tragedies which are eloquent of this ally's fortitude and service on the sea. During the war 2,475 British ships were sunk with their crews, and 3,147 ships were sunk with their crews set adrift. A total of 670 fishing vessels were lost also, and the merchant-marine service suffered over 15,000 casualties.

¶On invitation from the French Society of Civil Engineers, eight American engineers have gone to France to share in studying reconstruction problems in that country.

SPRING SUSPENSION FOR ONE-MAN STRETCHER



The Stretcher Remains Level When the Wheels Pass over Obstructions, as is Shown Here. Above, at the Right, the Spring Suspension is Illustrated Alone

One of the outstanding features of a new two-wheeled running gear for a standard military stretcher is its spring suspension which enables the bed to remain level at all times. The device is the invention of an eastern surgeon who apparently has provided an apparatus that will permit one man to push or pull a stretcher over uneven ground without material difficulty or undue jolting of the patient. The stretcher is underslung, being suspended on a yoke that is pivoted to a semielliptic spring above the axle. Another point to which attention is called is that the head of the stretcher is lower than the foot end when not in use, which in most cases is considered advantageous.

¶It has been announced that one of the largest government-operated restaurants in London is making a profit of $500 per week and that soon several others are to be opened in various parts of England.

CHATEAU-THIERRY

How Marines Triumphed With Hun Eyes As Long-Range Targets

By E. T. BRONSDON

IT was the *Friedensturm,* the last and greatest of German offensives. Orders and proclamations captured on the persons of prisoners told frankly that the German high command was throwing every resource into the attack. From a *Junker* point of view the wedge was going through to Paris and Orleans. Foch's defensive legions were to be destroyed. The British were to be flanked and driven into the sea. The Americans were to be chased from their sectors, captured or forced to flee from their port of entry, St. Nazaire. Later, when a dismayed Britain had withdrawn and France had been cut to pieces, the interlopers from overseas could be dealt with at leisure.

The storm broke at midnight on July 14, 1918. "Never since the second attack on Verdun has such artillery concentration been seen," stated the communiqué of General Meurthier next day. During two months of that former desperate defense he had commanded the thin line of France's Third Army; he commanded on the Somme in the Champagne sector, adjoining the American forces, on that memorable summer day.

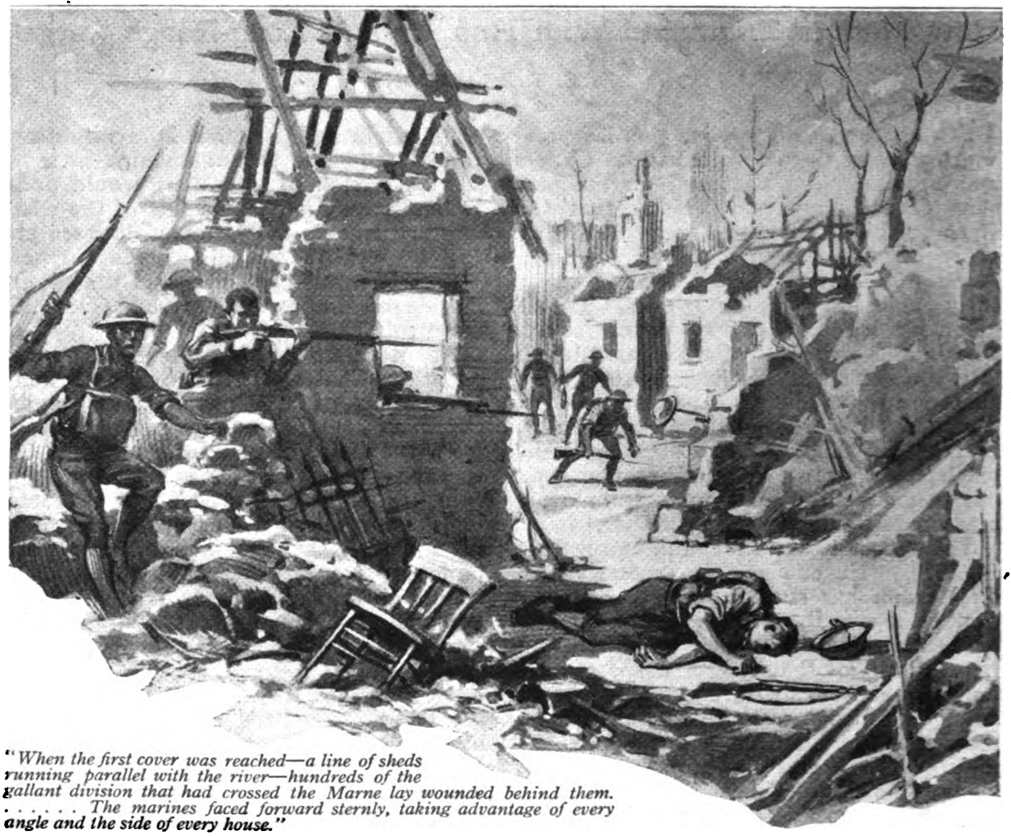
With a number of rifles and mortars. that would have locked wheels had they been placed in a double line on the Somme, the boches placed a box-barrage fire about the allied trenches from Vaux to St. Menehould. Long-distance cannon dropped projectiles in Meaux, Vertus, Châlons, and in every railhead and concentration point within 20 miles. The plan was simply to keep worn-out allied divisions from retiring, new divisions from coming forward for relief, and to preclude the possibility of ammunition or supplies of any kind being transported to the first-line trenches. The long-distance bombardment was for the purpose of introducing confusion. When the boche wedge broke through, the German commander planned to refresh his waning stores from the wealth that would await.

The Huns were confident of success. They knew that their drives of March and April had gained much territory with nowhere near the same concentration or desperation. In addition to this, another factor lay uppermost in their calculations. The new drive was against green, largely untried troops—Americans! Of course the French would aid, but with the Yankees in full flight, a hole would appear in the line through which an irresistible stream of Prussians would pour. It may have been that a few of the wiser military leaders in Germany doubted the entire futility of the defense these Yankees would put up, but the whole morale of the German attack was built upon this philosophy.

At the time of the first German occupation, Chateau-Thierry was a thriving French city of 7,000 people. It occupied the side of a steep hill sloping northward from the right bank of the Marne. On the rocky summit of this hill stood the ruins of the ancient castle of Thierry, built as a place of refuge by Charles Martel, in 730 A. D. It possessed many fine buildings for a place of its size, chief among these being the two courthouses, the communal college, three large factories making linen and cotton twist, and the communal cattle market. Most of the homes were of stone, and while a few of the poorer folk lived on the south bank of the river, the town proper lay north. This topography is important to us only because every yard of the town hill, every corner, every basement of a stone house, was drenched in American blood before the *Friedensturm* was definitely stopped.

From Vaux to Fossoy, opposite the Hun salient which had Chateau-Thierry as its apex, were the Prairie divisions from the American Third Army Corps. These included troops from Illinois, Indiana, Iowa, Wisconsin, and Minnesota. Field artillery of the 132d, 136th, 141st, and 149th also was engaged. On the right of the Americans was a wing of the French Third Army under Meurthier. On the left, part of Pétain's Fifth Army held the line north to Soissons. At Ablois, 19 miles from Chateau-Thierry, 8,000 American marines were held in reserve.

At 12:24 p. m., on July 15th, after 12 hours of furious bombardment, German engineers made their first attempt to throw a pontoon bridge across the Marne. Though protected by a standing barrage, laid down with precision on the American firing bays, and by a continuous strafing of the American batteries, every German on the pontoon company was wounded or killed, and the matériel brought forward for use completely demolished.



"When the first cover was reached—a line of sheds running parallel with the river—hundreds of the gallant division that had crossed the Marne lay wounded behind them. . . . . . . The marines faced forward sternly, taking advantage of every ***angle and the side of every house."***

Less than 20 minutes after this catastrophe, three more bridges were started between Vaux and Jaulgonne. At the latter town one bridge was maintained, and a few German troops managed to cross and gain a footing in the outskirts of the town. The other two bridges were smashed. Six more disastrous attempts were made to build pontoon bridges in the neighborhood of Chateau-Thierry, before finally the Germans secured sufficient accommodation for their troops in crossing. The allies here were favored by previous weather conditions; it had rained steadily from the fourth to the twelfth of July, and the Marne had deepened to a torrent. Had no rain fallen, the pontoons would not have been necessary, as the normal depth of the Marne at Chateau-Thierry is three feet, which is fair fording.

A continuous attack upon the American and French positions began at four o'clock in the afternoon. While daylight lasted, the Huns were repulsed with great slaughter, but with the night they crossed in hordes. During the conflict which took place on the south bank of the Marne, 33 Bavarian and Saxon divisions and eight Prussian divisions were identified, making a total of over 550,000 German troops who actually crossed the Marne.

Outnumbered six to one, the Americans were pressed back gradually from their lines. Morning found the Huns in possession of the fire trench all along the Marne from Vaux to Gannat, and fighting in the ***boyaus*** and support trenches. The line was bending slowly, steadily, but it had not broken. Conscious that the eyes of the civilized world were focused on them that morning, the Yankees fought on even while messages were being brought from Foch at headquarters advising a retreat. History has recorded how one American battalion commander, frenzied by what he considered the disgrace of being forced to give way, led his men in a gallant but hopeless attempt at a flank attack. Of the whole battalion, only sixty-odd escaped unwounded back to the lines.

At noon on July 16th, the Huns had gained a substantial foothold across the river from Ville Tourbe in Champagne to

Torcy on the Clignon branch of the Marne. Despite Anglo-American-French reserves rushed to the scene the terrible advance of the gray hordes continued. Fossoy, Crezancy, Azy, and Etampes fell. The slaughter was sickening, but in pursuance of the Prussian plan of success at any sacrifice of men, the Americans were forced back, side by side with their French brothers in arms. Headquarters manifested no uneasiness, but the fact that, 30 miles back, a sizable French reserve was forming was eloquent enough.

Then, with the last of the American reserves, came the marines from Ablois. These men, who had been chafing under the restraint which held them back from a battle in which their comrades were dying, attacked like famished wolves. Within 30 minutes after their first appearance they had rounded up a Saxon regiment entire.

When the kaiser and his cohorts had been figuring the point of least resistance, and in doing so had chosen the line defended by untried Yankee fighters, they had overlooked the marines. "When we fight, the enemy does all the surrendering," is more than their slogan; it is their tradition, and every man lives up to it proudly.

The marines had no machine guns, no hand grenades. The rifle and the bayonet sufficed them. Pouring into Etampes and Fossoy, they recaptured the two towns by the sheer impetuosity of their rush. Leaving these points to be taken care of by advancing lines of infantry, the marines rushed the bridges. Less than two hours from the moment of attack they had driven the Hun out of a swath two and three-eighths miles in width, crossed the Marne, and had thrown themselves flat in the mud of the outskirts of Chateau-Thierry.

Then ensued what probably was the most remarkable battle of the whole great war. It was a battle that must live, not only in American history but in the annals of every civilized nation. Because of that one exhibition alone it would be safe to say that no world power ever again will underrate the ability of Yankees to fight.

To understand this battle it is necessary to look again at the conditions. The steep hill, sloping up from the river, confronted the marines. On this hill was Chateau-Thierry. In Chateau-Thierry every street crossing, every basement of a house, every tower of a building or church concealed a machine-gun emplacement. It is not known exactly how many machine guns were placed in position here; the marines captured over 600, however, when they took the town. The battle was a conflict of men against machine-gun emplacements—and the men won! No one in the world ever imagined before that this could be done, but done it was. With no barrage to help them, with no explosives of any kind for demolition, the soldiers of the sea conquered the death-spitting pill boxes and nests supposed to be impregnable to anything short of T. N. T.

How could they do it? Marksmanship! In that one word lies the answer.

Before ever the marines saw a battle field, each man received a training with the rifle such as never before was given to any soldier. It may not be wise quite yet to describe this training. Suffice it to say that at the conclusion of this training each man was tried out on six ranges. He shot ten cartridges at a target 200 yd. distant, and the same number at each of five additional ranges, namely, 300, 400, 500, 600, and 700 yd. At each range a bull's-eye counted five; a bull's-eye was of 18-in. diameter at 200 yd. At 700 yd. it was one yard in diameter.

If, on his 60 shots, he made a perfect score of bulls, each marine could total 300. Eighteen of the men who attacked at Chateau-Thierry had equaled or bettered 295!

If a man, on his try-out, made a total of 202, he was considered an excellent shot (the average trained private will shoot about 45 under the same conditions) and was given a grade as "marksman." If he made 238, he attained the grade of "sharpshooter." If it mounted to 252, he was graded "expert rifleman," which was the highest honor.

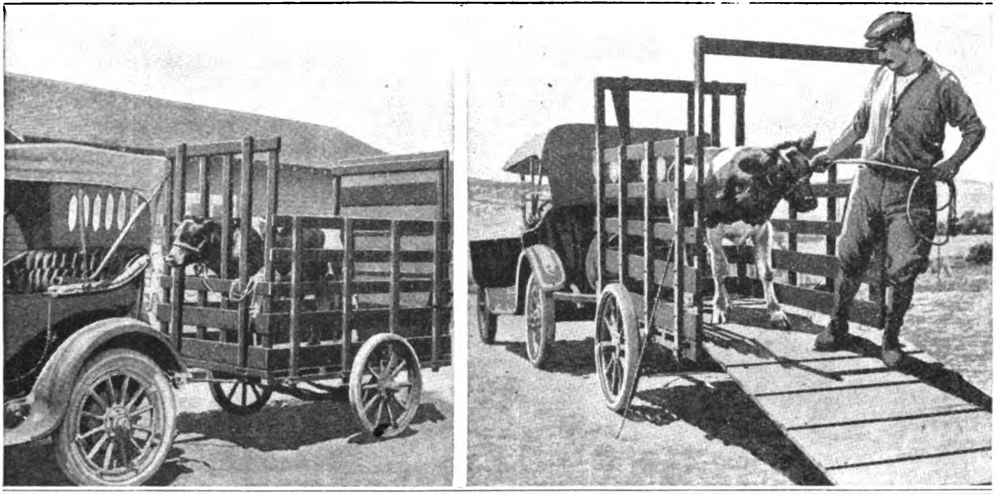
At Chateau-Thierry only ninety-odd out of 8,000—and most of these recruits—had not reached the grade of marksman, so thorough had the training proved. Nearly 6,000 were marksmen, 1,200 were sharpshooters, while the remainder were expert riflemen. A handful of these topnotchers were men who each year had shot well in the national championships.

The task that faced them as they lay in the mud at Chateau-Thierry can be stated simply: They had to pick off the machine gunners in the nests and emplacements by rifle fire! At ranges varying from 50 to 500 yd. they picked the slits in pill boxes, the face that peered over an automatic Mauser barrel, through a basement window, the eyes that leered down at them from roofs, chimneys, towers, and steeples. It was life or death, victory or defeat. While the boche "typewriters" chattered down ominously at them, they squirmed along, picking off gunners by the dozen.

When the first cover was reached—a line of sheds running parallel with the river—hundreds of the gallant division that had crossed the Marne lay wounded behind them. There was no time to tend to them, no place to take them. The marines faced forward sternly, taking advantage of every angle and the side of every house. It was straight Apache warfare. A marine would crawl around a corner. "Br-r-r," would go a Hun typewriter from an unexpected point and he would fall. His comrades, making a detour, would locate the emplacement, and then they would proceed to get revenge for the death of their comrade. While one of their number decoyed the gunner by holding out a helmet on a stick, the others would wait with leveled rifles. The second his face showed, a half-dozen bullets would hit him, and the gun would be out of action temporarily. Before another gunner could take his place, a short charge and sharp work with the bayonet would finish the rest of the gun crew.

At noon next day infantry moved forward to relieve the marines. The detachment found Chateau-Thierry fully occupied by the remnant of the gallant division. As the word was flashed back to headquarters scores of stretcher bearers started for the town. The wonder of the tremendous achievement was in the mind of everyone. The sad part of it was yet to be counted. In dead and wounded in this battle, the marines lost 4,700 men out of 8,000.

It is necessary to look only at the events of the next few days to see how far-reaching were the results of this engagement. Foch, finding that after all his final reserves would not be needed to block the road to Paris, threw them on the line from Vaux to Soissons. How badly the German morale had been crushed by the reverse was shown by the rapid advance made by this detachment. In three days they had pushed the disheartened boches back from five to nine miles, and the retreat had just begun. All the world knows how the *Friedensturm* ended.



Left: A Modern, Efficient Way of Transporting Live Stock: The Trailer Is Strong but Not Heavily Built and can be Attached Quickly. Right: The Rear-End Gate, When Let Down, Serves as a Gangplank. The Running Gear Is Similar to That of a Light Truck

RANCH LIVE STOCK CARRIED IN AUTO TRAILER

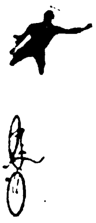
A western cattle rancher has found that he can make quick deliveries of live animals by the use of a live-stock trailer which attaches to the rear of his automobile. It has but two wheels, which are of the size used on auto trucks and are equipped with hard-rubber tires. A stanchion is incorporated in the front end of the carrier, while the end gate is made extra strong so that it can be let down for use as a gangplank.

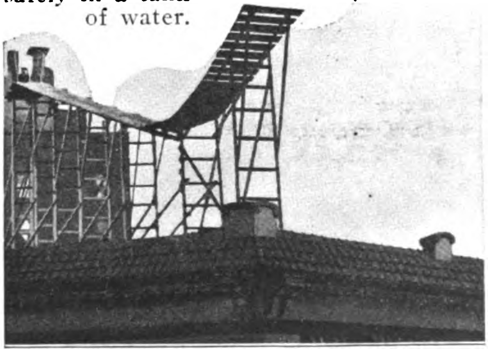
NEW PLANES TO FAR SURPASS ANYTHING YET ATTEMPTED

That the world has seen but the beginning of the building of monster aeroplanes is indicated by plans for new air craft, some features of which have recently been made public. It is learned that in both America and Great Britain plans are being made for the manufacture of 5,000-hp. machines, with which it is hoped to fly across the Atlantic. But far surpassing these bold undertakings is the plane projected by Caproni, the famous Italian aeroplane constructor, which will be equipped with motors aggregating 18,000 horsepower.

CYCLIST MAKES DARING LEAP TO AID CHRISTMAS FUND

While there is no apparent connection between circus "stunts" and contributing to good causes, the former has proven a decided help to the latter in many "drives" for funds. Recently, in a campaign in New York, a daring bicycle rider was engaged to make a 185-ft. leap across a street, as shown, landing safely in a tank of water.





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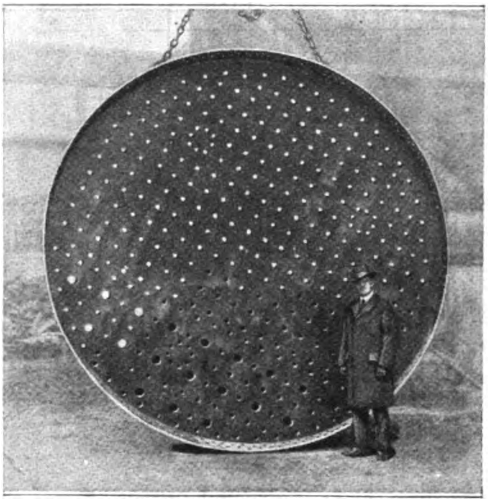
Famous Circus Cyclist Advertising a Christmas Charity by Making a 185-Foot Leap from an Incline into a Tank of Water

THIRTEEN-FOOT BOILER HEAD MADE FROM SINGLE PLATE

One of the largest boiler heads ever constructed from a single plate was made recently for a shipbuilding company in Portland, Me. It measured 13 ft. in diameter and 1¾₁₆ in. thick. A car had to be built according to special design to carry it to its destination.



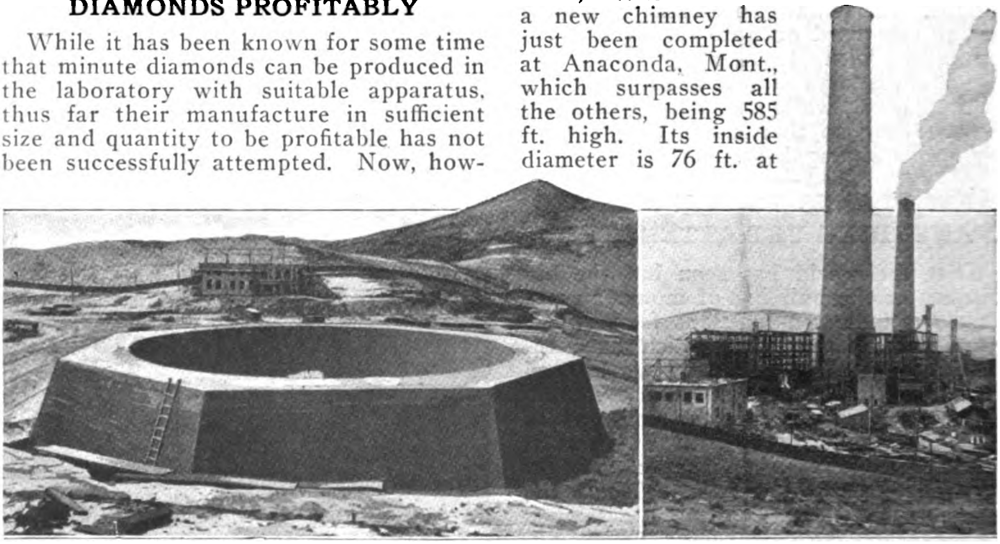
One of the Largest Boiler Heads Ever Made from a Single Plate: It Measures 13 Feet in Diameter and Is More Than One Inch Thick

POSSIBLE METHOD OF MAKING DIAMONDS PROFITABLY

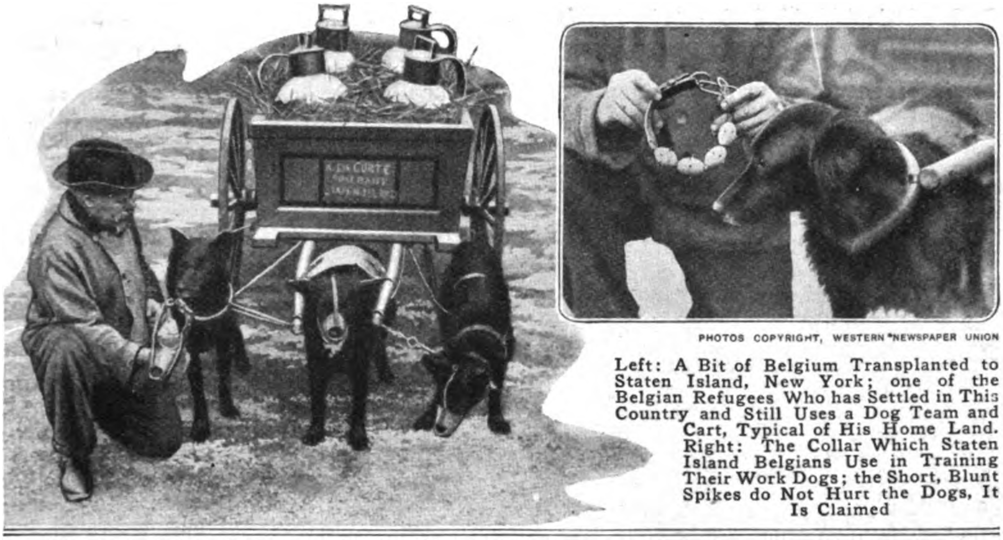
While it has been known for some time that minute diamonds can be produced in the laboratory with suitable apparatus, thus far their manufacture in sufficient size and quantity to be profitable has not been successfully attempted. Now, however, after years of quiet experimenting, a well-known British inventor and scientist is inclined to the belief that fair-sized gems can be produced on a commercial basis. The method which he suggests is that a large mass of iron, alloyed with other elements, be submitted to suitable heat treatment, and after setting, but when still at a temperature permeable to gas, be subjected to carbon monoxide at a pressure of about 1,000 atmospheres for a long time. It is thought that diamonds in payable size and quantity might be obtained in this manner. The long list of experiments performed includes heating carbons and carbon compounds when under great pressure, by means of a central conducting core through which an electric current was passed. But it is interesting to note the inventor's conclusion that on the whole there was no evidence that diamonds had been produced by any of the chemical reactions brought about by these means. The apparatus used by him in this work involved a heavy outlay.

NEW CHIMNEY AT ANACONDA SURPASSES ALL OTHERS

The world's record for the tallest chimney is one which has not remained long with any one structure in the last few years. For a time the stack, 570 ft. high, at Sagonoseki, Japan, overtopped all others. Then there was built a 571-ft. chimney for a large smelting company at Tacoma, Wash. Now a new chimney has just been completed at Anaconda, Mont., which surpasses all the others, being 585 ft. high. Its inside diameter is 76 ft. at



Left: Foundation of the Great Stack, Containing 5,000 Cubic Yards of Concrete. Right: The Tallest Chimney in the World, 585 Feet High, with a Smoke Passage 76 Feet in Diameter at the Base, Capable of Transmitting 4,000,000 Cubic Feet of Air and Gas per Minute, at a Velocity of 24 Feet per Second



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Left: A Bit of Belgium Transplanted to Staten Island, New York; one of the Belgian Refugees Who has Settled in This Country and Still Uses a Dog Team and Cart, Typical of His Home Land. Right: The Collar Which Staten Island Belgians Use in Training Their Work Dogs; the Short, Blunt Spikes do Not Hurt the Dogs, It Is Claimed

the base and 60 ft. at the top, while the corresponding dimensions of the Tacoma stack are 39 ft. and 23 ft. 11 in. A chimney at Great Falls, Mont., is 506 ft. high and 50 ft. in diameter at the top. The Washington monument is 55 ft. square at its base and 555 ft. high, and by cutting off a very little of its corners it could be set in the smoke passage of the enormous Anaconda structure.

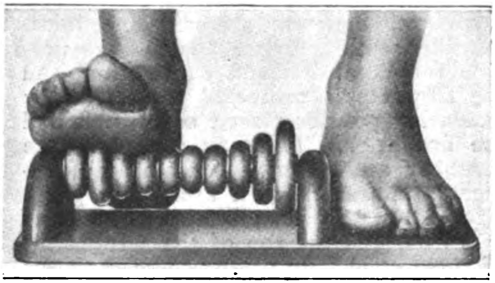
The stack will transmit 3,000,000 cu. ft. of gas plus 1,000,000 cu. ft. of cooling air per minute, at a velocity of 24 ft. per second. It contains 2,300,000 radial bricks, equal to 7,000,000 common brick, and is part of a $2,000,000 smoke-treatment plant connected with a smelter. This plant is designed to catch no less than 240 tons of solids per day, or 88 per cent of that now going to waste through smaller chimneys. There is a complete recovery of the arsenic, or about 35 tons per day.

BELGIANS ON STATEN ISLAND RETAIN OLD CUSTOMS

When the Huns invaded Belgium, several of the fleeing families sought refuge in Staten Island, New York, where they have settled permanently, adopting many American ways, of course, but clinging to certain home-land customs which are of much interest to their neighbors. One of these is the use of dogs as draft animals. Dog teams are hitched to two-wheel carts, loaded with milk or vegetables, which are made like hundreds of others to be found in Belgium. As the accompanying picture shows, the animals wear muzzles of special design, which do not interfere with eating and drinking. A special collar, made in part of pronged egg-shaped units, is used in training the dogs to work.

NEW FOOT-MASSAGE DEVICE FOR FALLEN ARCHES

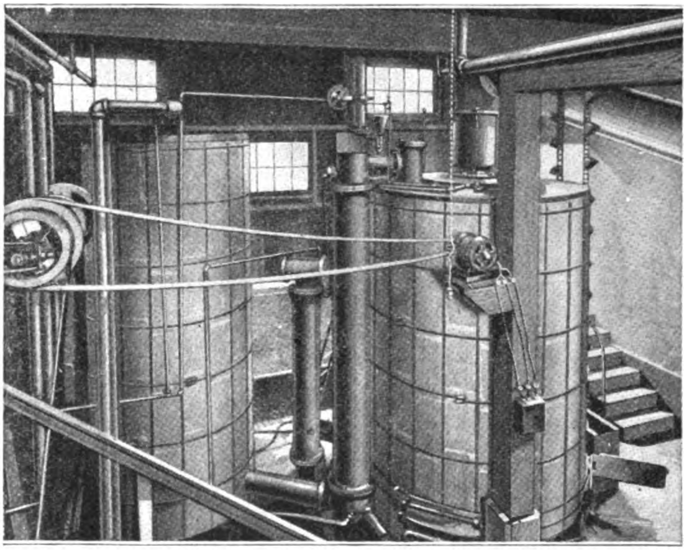
Seeking relief from fallen arches, an engineer has invented a muscle strengthener with which the benefits of massage and exercise can be applied to the bottom of the foot. It consists of a series of wooden disks of varying diameters, mounted on a rod in such an order that they thoroughly massage the entire sole when the foot is moved back and forth over them, causing them to revolve. It is claimed that this treatment not only tends to strengthen the muscles, but also stimulates circulation and gives relief after hard walking. It is designed for home or gymnasium use.



Foot Exerciser Designed to Strengthen the Muscles of the Arch, Stimulate Circulation, and Relieve Strain When the Feet are Tired from Much Walking

GAS PRODUCER'S OUTER SHELL MADE OF CONCRETE STAVES

Reinforced concrete has been used instead of steel in the construction of a 200-hp. gas-producing plant. Durability is one of the chief advantages said to result from this radical departure from standard practice. Deterioration of steel at the bottom of the gas producer, where wet ashes come in contact with it, frequently destroys the shell long before the rest of the apparatus has outlived its usefulness. The same thing holds true of the scrubber shell, the life of which is also shortened by corrosion. By the new plan the shells are built of tongue-and-groove reinforced-concrete staves. The joints are filled with a fireproof cement to provide for expansion and contraction, and the concrete is protected from heat by insulating powder placed between it and the fire brick. The staves used in the scrubber are made with waterproof cement and treated with asphaltum paint. The top of the gas producer is made of cast iron, and the top of the scrubber is of sheet steel. By arrangement with the builders of these shells local contractors may use their molds for making staves, thus saving freight charges.



The Outside Shells of This 200-Horsepower Gas Producer and Scrubber are Made of Tongue-and-Groove Reinforced-Concrete Staves, and are Insulated against Heat on the Inside

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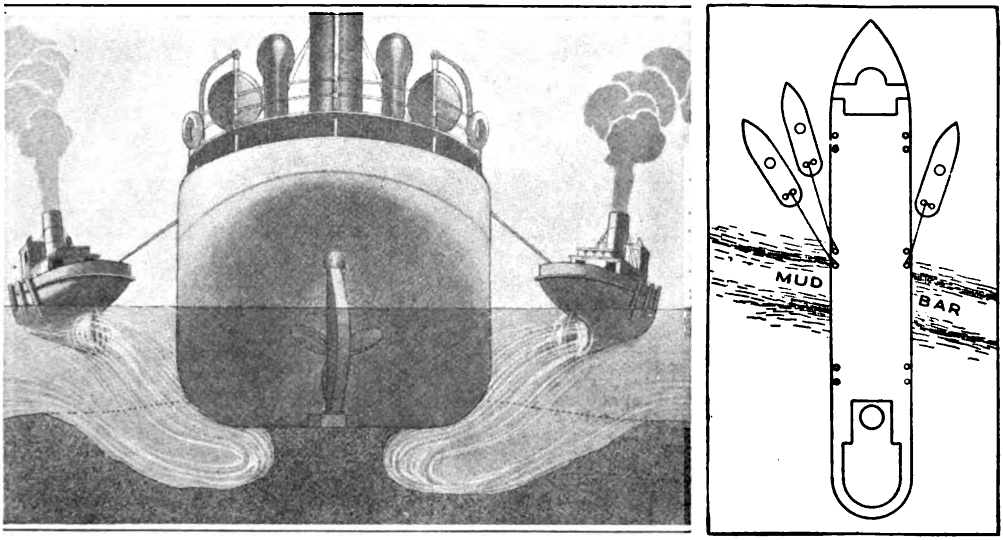
ℭThe coming of peace has caused a revival of the proposal to establish a large floating dry dock at Kingston, Jamaica, in anticipation of increased shipping via the Panama Canal.

SEEK TO IMPROVE LIFE ON MOUNTAIN FARMS

The little semiarid farms, giving scant subsistence to more than 3,500,000 people in remote mountainous sections of West Virginia, Kentucky, Tennessee, Virginia, and North Carolina, are to be made truly profitable if the campaign started by the Department of Agriculture produces the results sought. There are approximately 500,000 of these mountain farms, 10 to 35 miles from any railway, which give the tillers an average income of $100, the rest of a meager livelihood being obtained by working in mines and lumber camps. The department has had its representatives living on farms of this sort, and by practical tests they have found ways by which the annual receipts from the average mountain tract can be increased to $650. Literature is being widely distributed among these mountain folk telling them how to apply simple scientific principles to their efforts. For example, instead of allowing the land to "rest" and grow up to weeds periodically, rotation of crops is urged. The value of using more fertilizer and keeping more stock is pointed out, and just how coöperative creameries can be started is explained. Women demonstrators have given lessons in household management, cooking, canning, sewing, making butter, and so on.

CURRENTS FROM TUGS' SCREWS DIG MUD FROM UNDER SHIP

Powerful currents set up by the churning propellers of three tugs, made fast alongside, freed the steamship "Henry Steinbrenner" from a bar in Lake Erie, at the mouth of the Detroit River, some time ago. Inbound and loaded with 2,000 tons of coal, the vessel ventured from the marked channel to save time, and met with grief. It struck at right angles a ridge, some 15 ft. wide and 19 ft. below the surface. The ship, drawing 20 ft., mired in a foot of mud and came to a dead stop, from a speed of 10½ miles,



Stuck on a Mud Bar in Lake Erie, the Steamer "Henry Steinbrenner" was Released by Directing the Current from the Propellers of Three Powerful Tugs against the Bar, Which was Gradually Removed. The Diagram at the Right Shows the Relative Positions of the Steamer, the Tugs, and the Mud Bar When Work Began

in half of its 500-ft. length. When tugs failed to swing it off the bar, dredging was begun. One of the tugs took up its position on the starboard side, and the other two on the port side. Fast with three-inch hawsers, they pulled forward and outward so that the strong currents of water set in motion by their screws shot against and ran abaft and downward along the sides of the freighter. The operation was continued for three hours, the tugs being slowly swung from side to side about 30 ft. forward of the bar. When soundings were made it was found that a foot of mud had been dredged. The vessel's own screw was then started in reverse, so as to throw a strong current of water forward along the keel. This, wedging between the opposing currents from the tugs, swept out much of the mud that remained at either side. An hour later, after a total of four hours' work, the freighter responded to the pull of the port tugs, and the engineer put full steam ahead. The combined energy of the three tugs and the steamer did the trick, and the latter, unharmed, was floated.

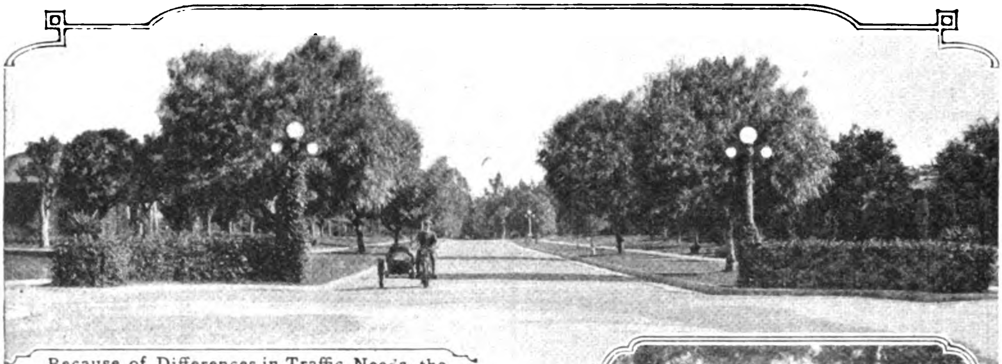
MAY USE BAMBOO STALKS AS TELEPHONE POLES

This spring tests are to be made of bamboo telephone poles cut from a bamboo forest of several acres which was started six or seven years ago in the San Joaquin Valley, California. The canes have attained a height of 40 to 60 ft., and in some cases are 8 in. in diameter. Those interested in the project are hopeful that, with proper protection against decay underground, the stalks will prove satisfactory for use on certain lines. Their first cost would be far less than wood.

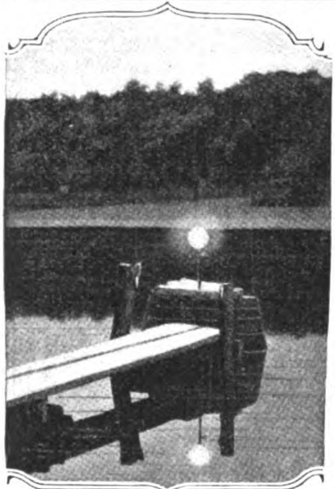
Bamboo Forest in San Joaquin Valley, California, from Which Canes are to be Cut for Use as Telephone Poles: The Canes, being Light, can be Handled Easily, and Their First Cost Is Low

¶A peace celebration, different from any other rejoicing over the signing of the armistice, was the restaging for the first time in a generation of the Sioux Indians' "victory dance" on one of the reservations in the Northwest. The last time this primitive ceremonial was participated in, it is said, was on the evening of the massacre of General Custer's band by Sitting Bull's braves.

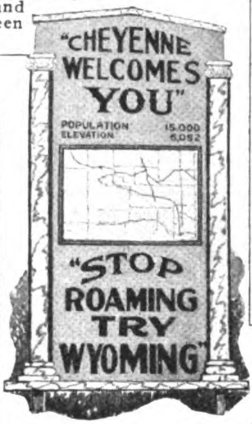
CIVIC FEATURES THAT PROMOTE THE COMFORT



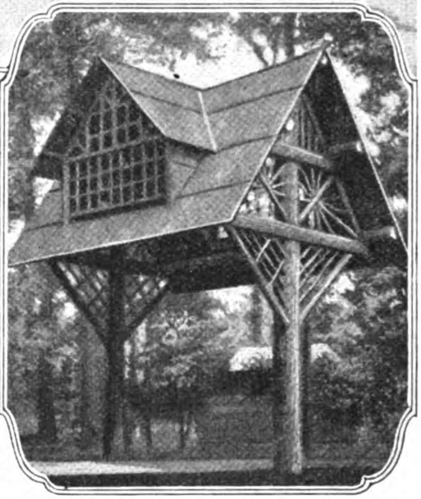
Because of Differences in Traffic Needs, the Width of Cordova Street, Alhambra, California, is Changed from 60 to 40 Feet at This Point. That the Decrease in Width may Not be Offensive to the Eye, Hedges and Ornamental Lights have been Placed Here



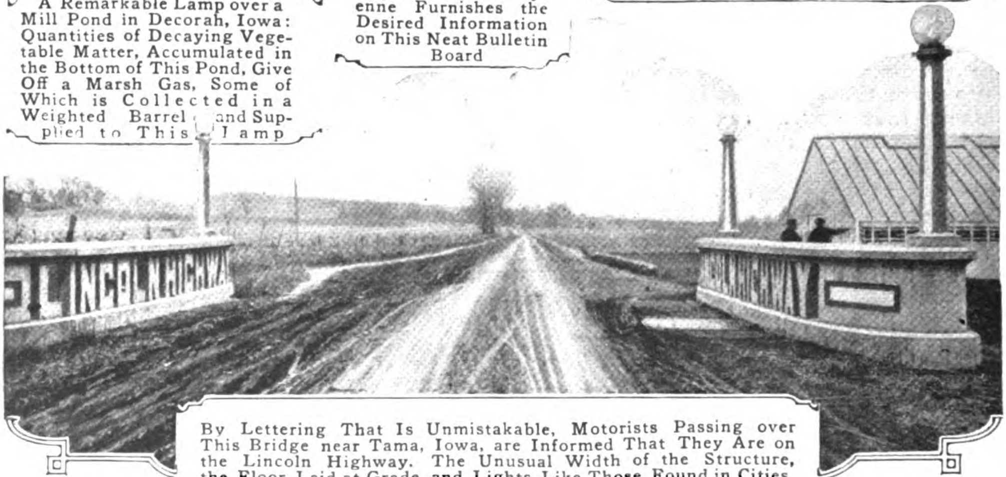
A Remarkable Lamp over a Mill Pond in Decorah, Iowa: Quantities of Decaying Vegetable Matter, Accumulated in the Bottom of This Pond, Give Off a Marsh Gas, Some of Which is Collected in a Weighted Barrel and Supplied to This Lamp



Motorists Entering a Western Town Inquire about Three Things — the Road, Population, and Altitude. The Latter Governs Carburetor Adjustments. Cheyenne Furnishes the Desired Information on This Neat Bulletin Board

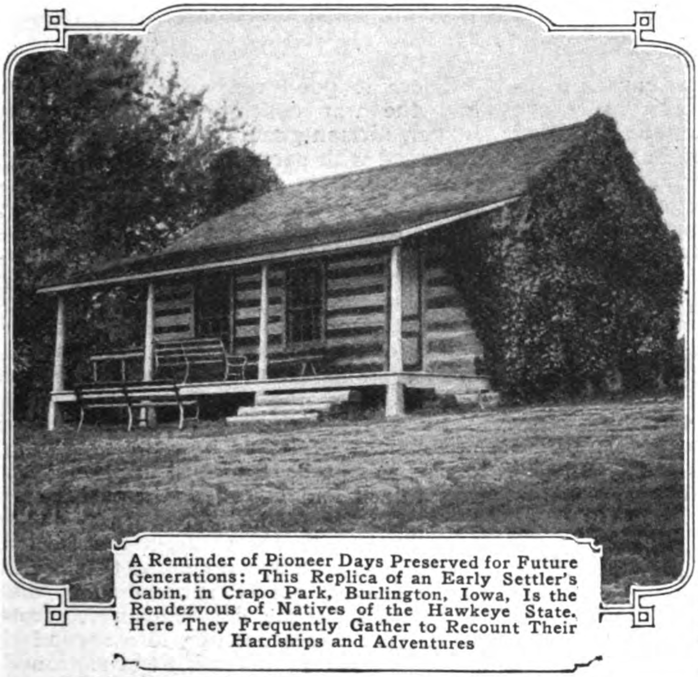


In Belle Isle Park, Detroit, Michigan, Which Is One of the Most Attractive Municipal Recreation Centers in America, Is This Big Rustic Bird House Made of Logs and Set High above the Ground So That It Serves Also as a Shelter for Many Pleasure Seekers

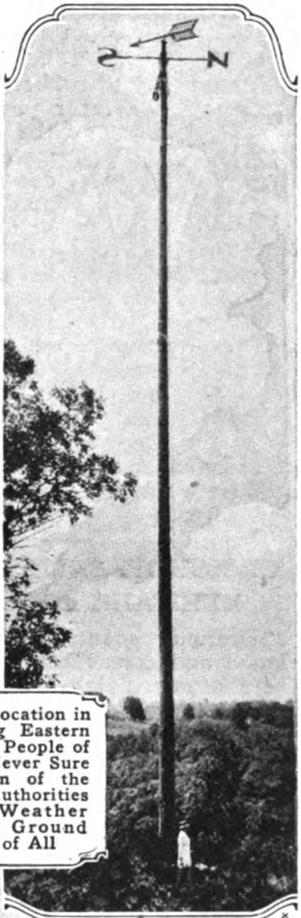


By Lettering That Is Unmistakable, Motorists Passing over This Bridge near Tama, Iowa, are Informed That They Are on the Lincoln Highway. The Unusual Width of the Structure, the Floor Laid at Grade, and Lights Like Those Found in Cities, **Are Features That Delight Every User of the Thoroughfare**

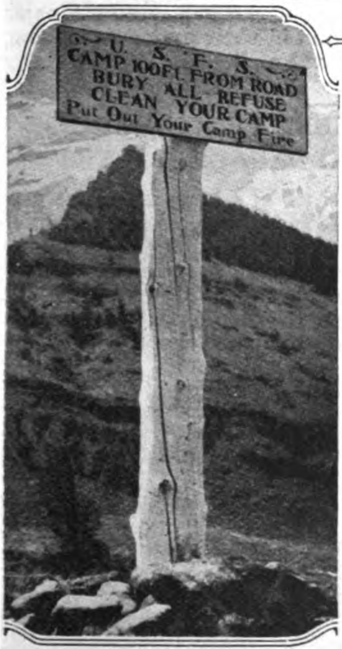
AND ENJOYMENT OF VISITORS AND RESIDENTS



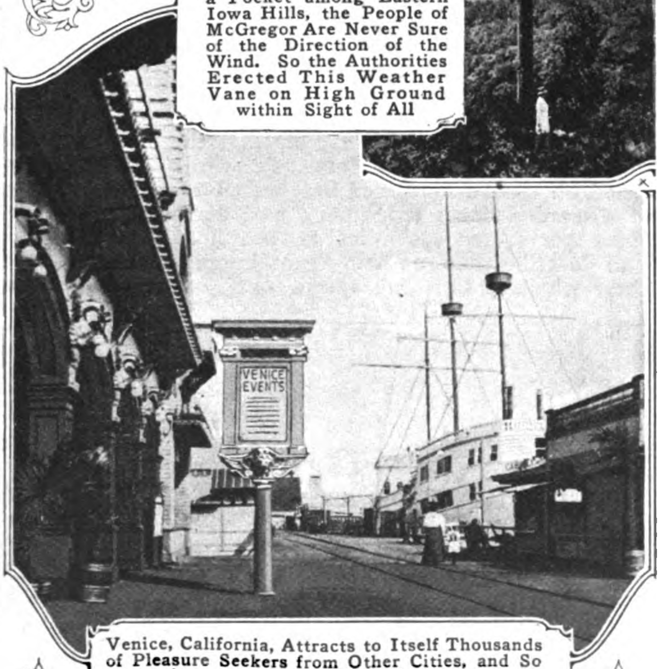
A Reminder of Pioneer Days Preserved for Future Generations: This Replica of an Early Settler's Cabin, in Crapo Park, Burlington, Iowa, Is the Rendezvous of Natives of the Hawkeye State. Here They Frequently Gather to Recount Their Hardships and Adventures



Because of Its Location in a Pocket among Eastern Iowa Hills, the People of McGregor Are Never Sure of the Direction of the Wind. So the Authorities Erected This Weather Vane on High Ground within Sight of All

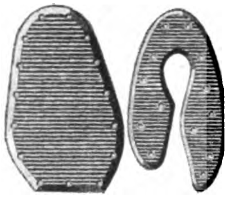


It Is Essential in the West That Campers Be Good House-keepers, Otherwise Refuse Becomes Offensive and Forest Fires are Started. As a Reminder, This Sign has been Erected in Shoshone National Forest, on the Route to Yellowstone Park



Venice, California, Attracts to Itself Thousands of Pleasure Seekers from Other Cities, and So There Are at All Times Many People in Town Unfamiliar with Events and Places of Interest. That the Necessary Information may Be Available for Visitors, This Large, Ornamental Bulletin Board has been Set Up on the Pier

ECONOMIZE RUBBER IN MAKING NOVEL HEELS AND SOLES



The scarcity of rubber has caused manufacturers, wherever possible, to reduce the amount of that material used in various articles. An example of this is to be found in skeletonized rubber soles and heels of European make. Considerable rubber has been saved by making them without centers. The edges are beveled and holes are provided for small screws or nails, while the wearing surface is corrugated transversely. The same makers also produce a full sole of rubber with beveled edges.

GRASSHOPPERLIKE MACHINES KEEP AIRDROME MOWED

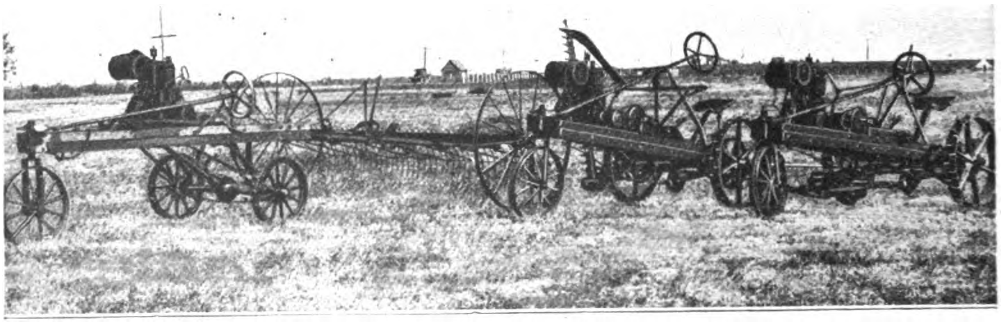
"Everman scouts" are peculiarly designed and constructed machines, but at the Everman flying field, where they are in use, they are giving splendid service. Contrary to what one would expect, Everman scouts are not in the least aeronautically inclined. They are motor-propelled hybrids that have contributed to America's aerial preparations by keeping the turf closely cropped and well raked at Everman field, thereby facilitating the work of the student pilots. A whole squadron of the machines has been built of discarded farm machinery and aeroplane parts by mechanics at the post, who describe them as being grasshopperlike both in design and speed.

EFFICIENT PARACHUTES USED BY HUN FLIERS

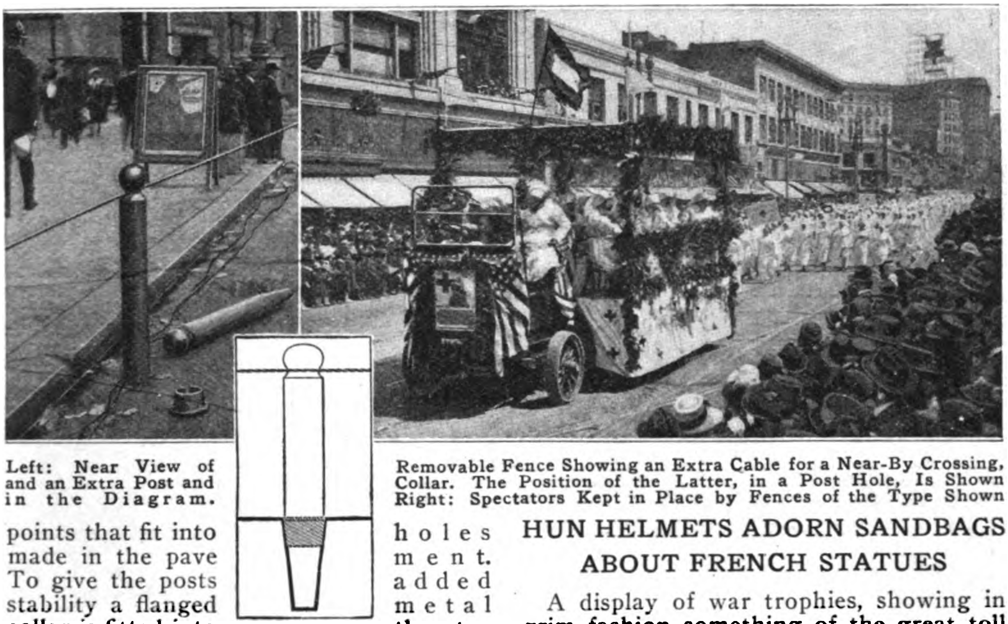
There is good reason to believe that had the war continued a few months longer, airmen generally would have been equipped with parachutes. A strong basis for this contention is the fact that parachutes were already in use by the enemy. During the last few days of fighting, several flying Huns saved themselves by leaping from flaming aeroplanes and floating gently to the ground beneath bellied parachutes. One of these airmen landed a couple of miles behind the American lines after jumping from his plane, which had been fired by incendiary bullets from a Yankee's machine gun. After being taken prisoner he explained how the life-saving device was used. Strapped to his body, it was folded and placed like a cushion on the seat of the plane. When it was necessary to abandon the plane, it was turned, nose up, at a sharp angle. At the instant the machine, nearly perpendicular, was about to stall, the flier leaped free from it, the parachute opening in a second or two and carrying him safely to the ground. American airmen who inspected the parachute were loud in their praise and strong in their approval of it.

REMOVABLE FENCE FOR USE ALONG PARADE ROUTES

The authorities of a large city have provided the police with a special fence, which can be quickly erected along the curbs of streets through which parades are to pass, and as quickly taken down when no longer needed to keep back the crowds. The posts are of turned wood with sharp



Built with a Triangular Frame, High at the Front End and Mounted on Three Wheels, the "Scouts" Mow and Rake the Airdrome Efficiently. Three of the Machines are Shown Above



Left: Near View of Removable Fence Showing an Extra Cable for a Near-By Crossing, and an Extra Post and Collar. The Position of the Latter, in a Post Hole, Is Shown in the Diagram. Right: Spectators Kept in Place by Fences of the Type Shown

points that fit into holes made in the pavement. To give the posts added stability a flanged metal collar is fitted into the top of each hole. A stout cable fastened to the top of the posts is stretched the length of the parade route except at street intersections. There lengths of cable are laid one side, to be strung just before the parade passes. The parades are followed by wagons, into which the posts and collars are gathered, while the cable is wound on drums.

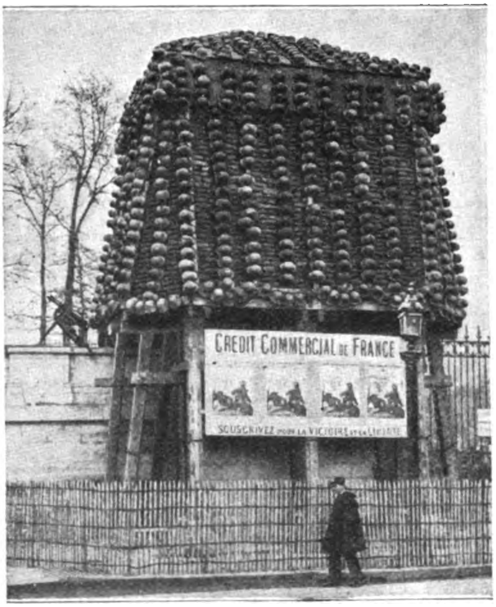
SCENES AND EVENTS OF WAR RECORDED ON FILMS

For the first time motion pictures are being made an important adjunct to printed pages of history. Officials at Washington in charge of compiling a pictorial history of the war have taken, and will continue to take, many movie scenes which undoubtedly will tell stories that no descriptions or still pictures could ever convey. Not only on the western front have the camera men been turning their cranks, but in remote Palestine, as well. It is said some very fine films have been made of the British forces at Damascus, by the Sea of Galilee, and elsewhere.

¶More than once mud from airmen's boots has caused serious trouble by interfering with the operation of control levers in an aeroplane, so a flier has devised a mud scraper conveniently attached to the side of his machine, which he uses before entering the cockpit.

HUN HELMETS ADORN SANDBAGS ABOUT FRENCH STATUES

A display of war trophies, showing in grim fashion something of the great toll the French exacted from the enemy, was



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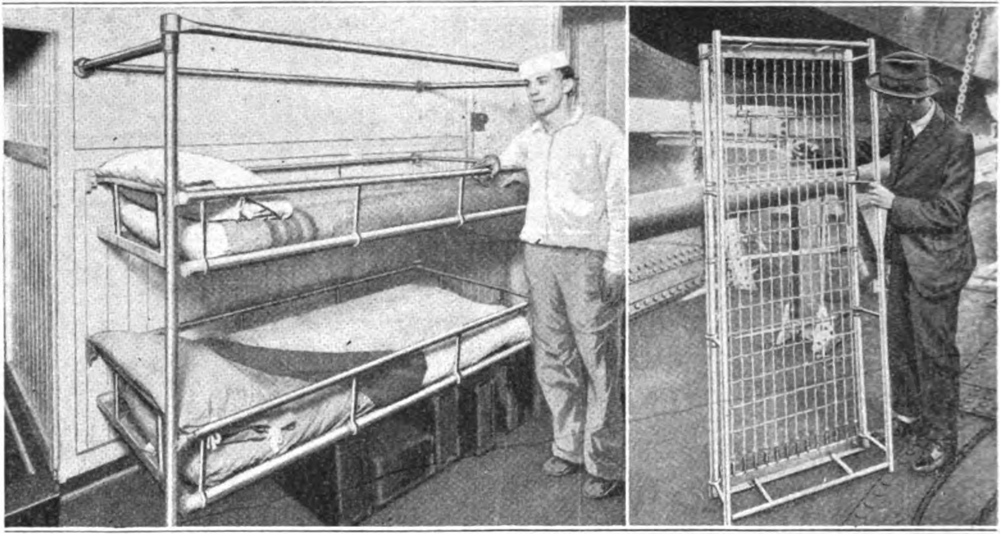
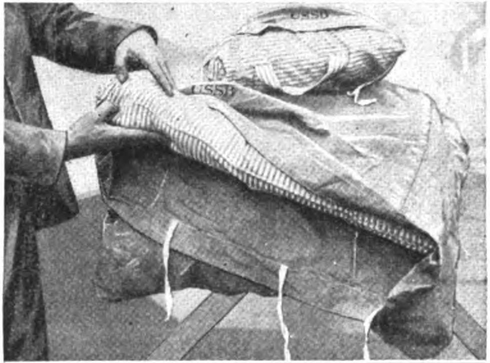
A Grim Reminder of War's Toll: Hundreds of German Helmets Adorning the Sandbag Protection Built about a Paris Statue

to be found at the entrance of the Tuileries Gardens, in Paris, during the closing weeks of the war. At this point stand two large statues which were shielded by walls of sandbags. Arranged in geometric lines on all sides of these coverings,



PHOTOS, COPYRIGHT, INTERNATIONAL FILM SERVICE

Left: Two Beds of the Type Which the United States Shipping Board is Furnishing Sailors and Firemen on Its New Fleet. Right: Inspecting the Springs, Which Are of the Most Modern Mesh Type, Set in a Strong Iron Frame



A Mattress and Pillow, Filled with Soft Tropical Fiber, and Provided with Denim Covers, Which can be Removed for Cleaning

like great rounded beads, were hundreds of helmets that had been captured from the Germans.

MODERN BEDS FOR SAILORS OF MERCHANT MARINE

The United States Shipping Board has banished the "donkey's breakfast," as sailors call the bag of hay or straw which served as a mattress for members of a ship's crew, and is supplying sanitary, comfortable beds in its stead. The springs are of the latest mesh type, attached to pipe frames having closed joints which prevent vermin from being harbored within. The whole bed can be removed from its metal supports for washing, painting, or inspection. With each set of springs is a mattress and pillow filled with a soft, resilient tropical fiber, known as kapok, which will remain buoyant in the water for about 48 hours, supporting many times its own weight, so that each of these articles will serve as a life preserver. Denim slips are provided for the pillows and mattresses, and warm blankets and spreads complete the equipment.

BLIND AND DEAF WOMAN FLIES IN AEROPLANE

What is said to have been the first flight made by a blind and deaf person was that undertaken by Miss Helen Keller, who is known throughout the world for her remarkable achievements in spite of being deaf, blind, and formerly dumb. The flight took place near Los Angeles, with a well-known airman at the wheel, and lasted nearly an hour. Miss Keller was enthused by the experience.

ALASKA BEGINS SHIPPING ANTHRACITE COAL

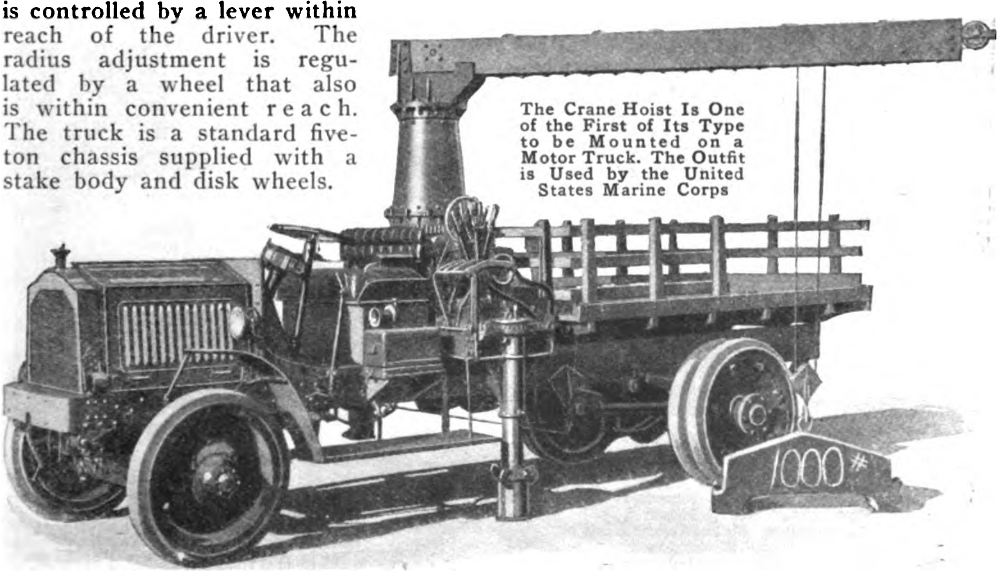
The new Alaska Anthracite Railroad, which is 22 miles in length, has been completed, it is announced, and the first trainload of coal, consisting of 100 tons of anthracite, has arrived at tidewater. This event is of much significance to the Pacific coast region, which has scant coal resources of its own, for it marks the releasing of vast fuel reserves which heretofore have remained inaccessible.

SALT HAM HELPS NAVY ELEVEN WIN ON GRIDIRON

To very salt ham, served once a week, sailors in training on Chicago's municipal pier give a large share of credit for their football team's phenomenal success the past season. Football experts, who know the rigid discipline under which the navy men live and their rather monotonous diet, on hearing that the navy eleven was to have a season a month longer than is usual, predicted that the team would "go stale." But the commissary steward, once a player himself, believed he could keep the men in good fettle despite this handicap. His plan was to serve very salt ham once a week, causing the players to drink quantities of water. In the opinion of those who ventured thus to disregard conventional training rules, this kept the men from "going stale" by relieving their systems of congestion. The team's victories are pointed to as a vindication of the diet.

CRANE IS MOUNTED ON TRUCK USED BY MARINE CORPS

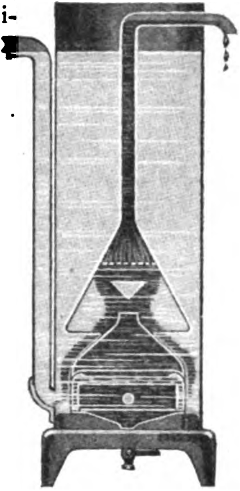
Included in the motor equipment of the United States Marine Corps is a specially outfitted truck that mounts a crane hoist with a 10-ft. boom. Jacks are provided at opposite sides of the chassis to relieve the frame of undue strains. Working at a radius of about seven and a half feet, the hoist has a lifting capacity of two tons. It is operated by a power take-off which is controlled by a lever within reach of the driver. The radius adjustment is regulated by a wheel that also is within convenient reach. The truck is a standard five-ton chassis supplied with a stake body and disk wheels.



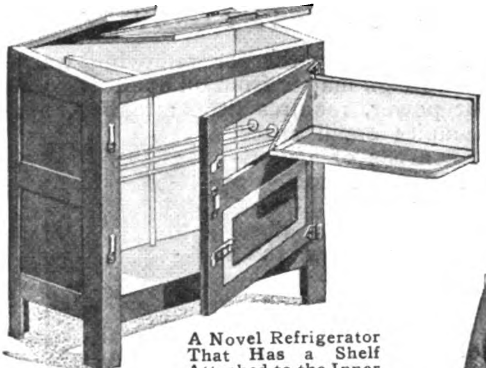
The Crane Hoist Is One of the First of Its Type to be Mounted on a Motor Truck. The Outfit is Used by the United States Marine Corps

COMPACT OIL SEPARATOR OPERATES BY GRAVITY

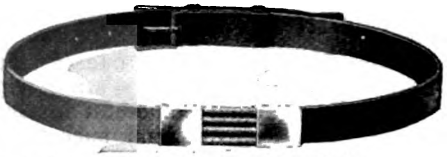
A new separator for removing water and foreign matter from oil operates without power, requires little attention, and occupies small space. It consists of a vertical cylinder containing especially arranged baffles. The oil enters near the bottom and flows into a circular guide designed to allow the solid matter to settle to the bottom, whence it can be drawn off. As the cylinder fills, the oil and water pass up through an opening in the top of a conical cover over the guide. The oil, being the lighter, accumulates in a second conical baffle, suspended above the one just mentioned, and, as the level of the water rises, passes off through a pipe which is an extension of the cone. A second outlet, for the water, is connected at the bottom of the separator and rises to the level at which it is desired to maintain the water within. If further cleansing of oil which has passed through the separator is desired, a series of filter pads is used.



SOME NOVEL AND LITTLE-KNOWN ACCESSORIES

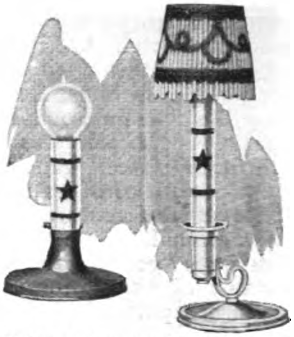


A Novel Refrigerator That Has a Shelf Attached to the Inner Face of a Door within a Door

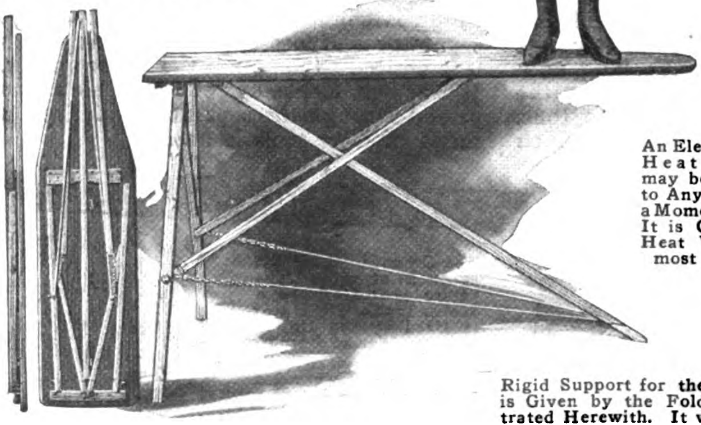


Men's Belt, Made Elastic by Insertion of Four Coiled Piano-Wire Springs at Rear

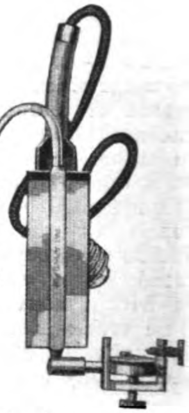
An Unusual Souvenir for Patriotic Functions—a China Bee Decorated in Red, White, and Blue. It may be Worn on a Coat Lapel or Pinned to a Place Card



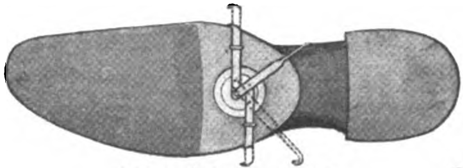
Quite an Appropriate Memento of the War, for Those Who Have a Relative in the Service, Is the Service-Star Candlestick, Two Forms of Which are Shown



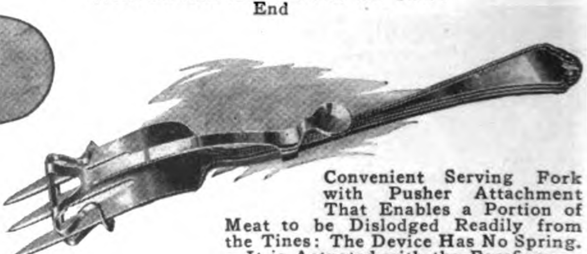
Rigid Support for the Ironing Board is Given by the Folding Rack Illustrated Herewith. It will be Observed That Plenty of Open Space is Provided beneath the Board at the Small End



An Electric Water Heater That may be Attached to Any Faucet in a Moment's Time: It is Claimed to Heat Water Almost Instantly



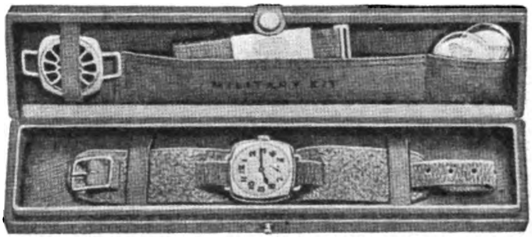
Many Persons Dislike Wearing Clumsy Rubber Shoes in Rainy Weather. For Them the Rubber Sole with a Mechanical Clamp, Here Shown, is Especially Intended



Convenient Serving Fork with Pusher Attachment That Enables a Portion of Meat to be Dislodged Readily from the Tines: The Device Has No Spring. It is Actuated with the Forefinger

INTENDED FOR THE HOME AND ITS MEMBERS

An Economical Oven That Fits in the Doorway of a Furnace and Utilizes the Latter's Heat, Thereby Obviating Necessity of Using a Range



For the Man in the Service: A Wrist-Watch Set with an Extra Strap, Two Extra Crystals, and a Crystal Guard

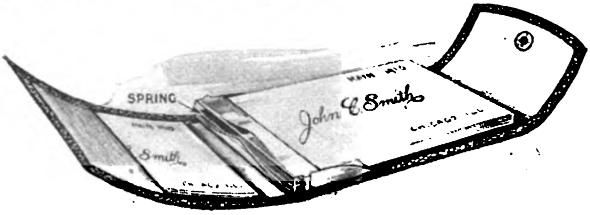
Patriotic Emblem for Coat Lapel, Framing Miniature Portrait of Soldier: The Eagle Is Gold Plated and the Flag Enameled in Colors

This Military Wrist Watch Includes a Small Compass, Obviously of Convenience to the Soldier or Sportsman

For the Modern Kitchen: Five Separate Wall Racks Holding Moisture-Proof Glass Jars of Different Capacities, Each Instantly Removable

Suburbanites Whose Telephone Calls Are Frequently Long-Distance Ones will Find This Three-Minute Sandglass a Most Convenient Accessory

Here Is a Screen That may be Rolled Like a Window Shade, a Feature That Meets the Storage Problem in Winter and Also Simplifies Window Washing in Summer



This Case is Supplied with a Spring Clamp That Holds One's Unbound Business and Visiting Cards in Book Form and Permits Them to be Removed One at a Time, without Disturbing the Pack

FROM A GERMAN PRISON TO THE ARCTIC

By ALFRED L. FLUDE

LAST summer, in Mourmansk, Russian Lapland, I met Harry Drope, of Brandon, Manitoba, formerly a member of the Princess Pat Regiment. He had escaped from a German prison camp into Russia, and at last into the Arctic on his way back to England, where he once more reported for duty. This is the way he told his story while we were sitting on a lifeboat on the well deck of H. M. T. "The Czar," carrying 1,300 refugees, who had escaped from all over Russia, down to England.

"I was captured in 1915 and sent to a German prison camp, where the food was very bad and the work was very hard."

"I was captured in 1915 and sent to a German prison camp where the food was very bad and the work was very hard. The worst time in the life of a prisoner under the Germans is those first weeks before the Red Cross locates him and sends him enough food to keep body and soul together. We were given a few ounces of black bread daily and a bowl of soup with no food value, and which smelled so badly that it was simply impossible to eat it.

"Within a few weeks I was transferred to a camp in German Poland, where we were employed in rebuilding the villages which had been destroyed by the Russians. It was good outdoor work, and as soon as my food packages came regularly, I thrived on it. I determined to escape into Russia, however, and planned with two Russian soldiers for the attempt. For several weeks we saved a portion of our food each day until we had sufficient for two weeks, which we thought would give us time enough for the trip. When the time came, we managed to hide behind the huge oven in the bakery, when the others returned to the barracks. At 10 o'clock we started, depending on the stars to guide our course due east. Before daylight we hid in a field of barley and remained there for the entire day. This was our procedure during the entire trip.

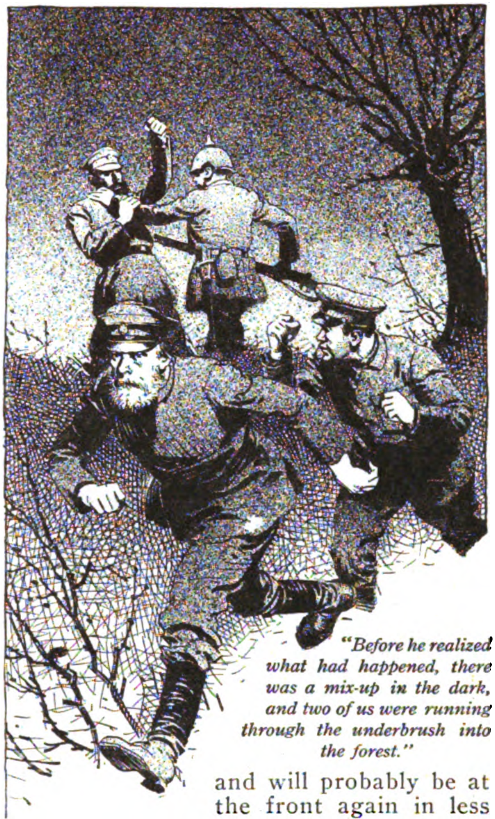
"At the end of two weeks our food was exhausted, but we were far from the Russian lines. We went to the home of a Polish peasant, waked him, and told him we must have food. He gave us potatoes and black bread, and promised not to tell of our visit. However, we made it a rule to make these visits before midnight so we would have a good start before we could be reported to the military. We were never refused, and many of the poor people gave gladly and wished us success.

"Just as we were congratulating ourselves that the journey would soon be over, we walked right into the arms of a German sentry and were promptly arrested by him. However, three prisoners at one time were more than he could master, and before he realized what had happened, there was a mix-up in the dark, and two of us were running through the underbrush into the forest. He kept firm hold on one of the Russians, however, and that was the last we ever saw of him.

"Twenty-six days from the time we started, we reached the trenches. The Germans were on one side of a river and the Russians on the other. The German lines were well guarded and were further protected by barbed-wire entanglements, heavily charged with electricity. As we crawled along the line, we could see in the moonlight the bodies of Russians who had attempted to go through. We were hiding in a huge shell hole close by the bridge, upon which we could see a German sentry walking. Suddenly we heard the clatter of a pony and cart crossing from the Russian side. We heard a man call to the sentry in Yiddish and finally come on toward the German side. My companion, who was a Russian Jew, called to the driver cautiously, in Yiddish. The pony was stopped and the man came toward us. He listened to the story, gave us some black bread from his cart, and asked us if we had any money. We offered him all we had, about 14 marks. 'That is too much,' he said. 'Give me seven marks.' He signed for us to follow and walked boldly back across the bridge, calling to the guard that he had forgotten to give him some cigarettes. As we drew near he told the guard that he had met two Yiddish friends who wished to go back to the Russian side, at the same time handing him the cigarettes and the money. The sentry waved us on and we walked slowly past him toward freedom. Up and down my back the chills were running, and I wondered how soon and where his bullet would strike, for I could hardly believe that he would be so easy. At last we reached the other side, and took to our heels into the shadows and were safe.

"After that it was simply a question of getting through the Bolshevik lines and into the North. Here my Russian companion was of inestimable help. At last I reached the Petrograd-Mourmansk Railroad and followed it until at last I reached the English-Serbian lines and went into Mourmansk on a real freight train. Why speak now of the hardships of the whole trip? I forget them and regard myself as unusually fortunate in having escaped.

"I am going back to London to report and will probably be at the front again in less than a month. I hope the war will not end until I have had my chance to repay the Hun for what he made me and others suffer as prisoners. I wish I knew how that other Russian fared!"



"Before he realized what had happened, there was a mix-up in the dark, and two of us were running through the underbrush into the forest."

"As we drew near he told the guard that he had met two Yiddish friends who wished to go back to the Russian side, at the same time handing him the cigarettes and the money. The sentry waved us on and we walked slowly past him toward freedom."

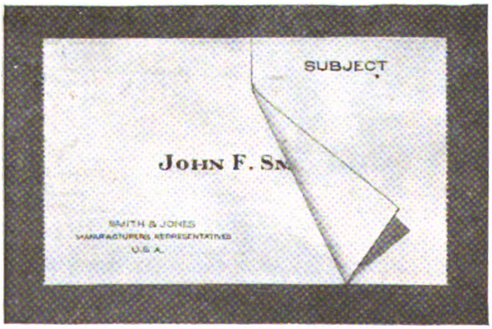
FRAME AIDS LAUNDRY WORKERS IN WRAPPING BUNDLES

Handy Wooden Frame Used by Laundry Workers as a Form in Which Articles are Piled Preparatory to Wrapping Them into Bundles of Uniform Size

A convenient accessory for commercial laundries is a wooden frame used in making bundles of rough-dry articles, neat and of uniform size for wrapping. It is made like a wooden box without top or bottom and is 2 ft. long, 14 in. high, and 12 in. wide. Each end being in two parts, the frame is divided into halves which are held together by simple clamps, dowel pins helping to keep them in alinement. The frame is placed on the wrapping paper and the laundered material is packed into it, after which the halves are removed.

BUSINESS CARD WITH FLAP FOR BRIEF MESSAGE

Convention has been departed from in designing a business card which is provided with a flap intended to be folded either against the back or the front of the main portion of the card. At the top of the flap is the word "subject," beneath which the one seeking an interview can indicate in a few words the nature of his errand and thereby can often save time for himself and others concerned.

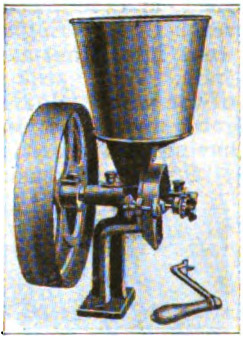


Business Card with a Detachable Flap on Which can be Written a Brief Message to the Person with Whom an Interview is Sought

NEW YORK TO ERECT ARCH AS WAR MEMORIAL

Very soon after the coming of peace New York City officials began making plans for a victory arch in honor of the Americans who fought in the great war. The proposal is to determine as soon as possible the general character of the structure and then erect a temporary arch in conformity with those ideas, before the majority of the troops return home. A number of prominent artists and architects have been selected to draw up plans and specifications. The board of aldermen has authorized the issuance of $80,000 in special revenue bonds with which the memorial will be erected on Fifth Avenue, at Madison Square.

EASILY OPERATED FLOUR MILL FOR HOUSEHOLD USE



It is believed that the war has created a demand for home-ground flours of various degrees of coarseness, which will be permanent among housewives. To meet this demand a small hand-operated mill, moderately priced, has been placed on the market. It fastens to the edge of a table and stands 19 in. high. A crank handle and a small flywheel make its rapid operation easy. The two grinding burrs are easily adjusted by a thumbscrew for grinding corn, wheat, barley, rice, rye, etc., to the desired degree of fineness.

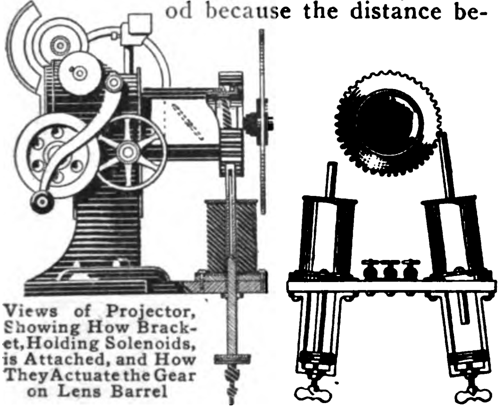
¶ Business interests in Tokyo, Japan, are planning extensive development of the port at Ominato, which is now only a small naval center at the northern end of the largest of the empire's islands, but promises to become an important transshipment point between the United States and northern Asia.

OVERCHARGING FOR HOTEL-PHONE SERVICE ENDS

One of the petty overcharges which have annoyed hotel guests in many large cities has been abolished by an order from the postmaster-general, who has control of the telephone systems of the country. This order provides that hereafter hotels, apartment houses, clubs, and similar institutions, shall not charge any guest or member more for the use of the telephone than is charged in public pay stations. The managements of these places are also forbidden to charge more for private-branch exchange stations than they, in turn, are required to pay.

FOCUSING MOVIE PROJECTOR FROM BODY OF THEATER

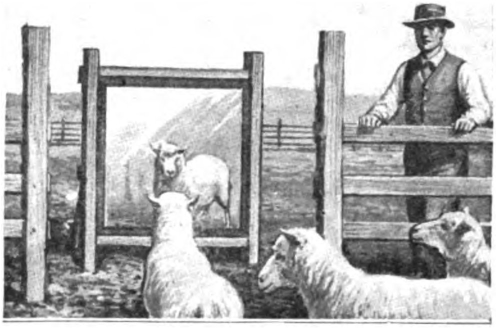
Among the recent inventions intended to improve the projection of moving pictures, there is an electric focusing system that may be controlled from any part of a theater. Usually the lens of a projector is focused manually, but in large houses this is not always a satisfactory method because the distance between the projection booth and the screen makes it difficult for an operator to determine the sharpness of a picture. The latest plan for obviating this trouble consists in fitting a ring gear over the milled bead that rotates the lens barrel, and actuating the former by means of two solenoids connected in a three-wire circuit controlled by a pair of push buttons, preferably installed in the middle of the theater about 14 ft. from the screen. An operator stationed at this point is able to watch the screen and refocus the lens when needed, by pressing one or the other of the push buttons. The latter control separate solenoids, one causing the lens barrel to be moved forward, and the other backward.



Views of Projector, Showing How Bracket, Holding Solenoids, is Attached, and How They Actuate the Gear on Lens Barrel

SHEEP DRIVEN INTO PEN WITH AID OF MIRROR

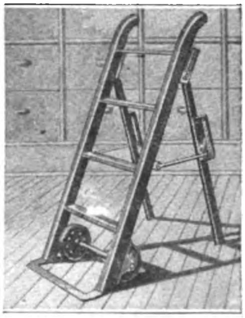
By placing a mirror, 3 ft. square, opposite the opening through which sheep were to be driven, an Australian grower has been able to get the animals to pass into pens where they were wanted, without difficulty. True to its well-known habit of following the lead of its fellows, each sheep on seeing its own likeness in the mirror thought it was another of the flock and passed through the opening at once. While the device has been employed only as indicated and by but one ranchman, so far as is known, doubtless there are many places where it could be used.



A Mirror Installed Opposite the Entrance to a Sheep Pen Makes the Animals More Ready to Enter the Gate, Because Each Takes His Reflection to Be Another Sheep Already in the Inclosure

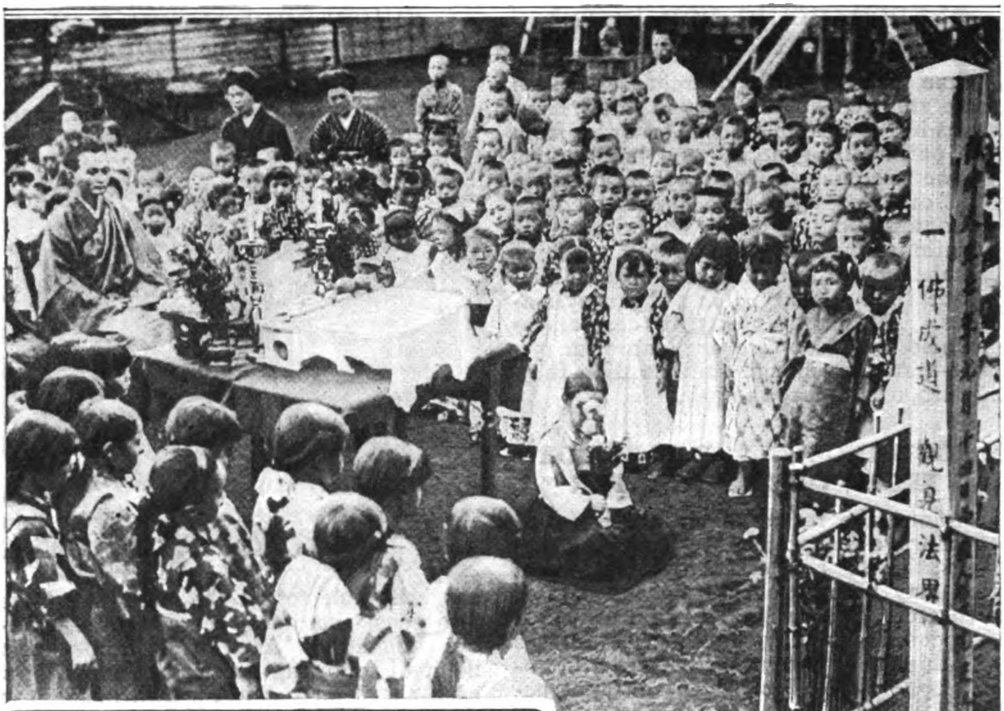
STEPLADDER AND HAND TRUCK ARE COMBINED BY INVENTOR

A hand truck that also serves as a stepladder has recently been invented. The device is fitted with four treads and at the rear side has a hinged support that fits in front of the axle, out of the way, when not in use. An additional advantage of the combination is that the support will hold the truck in loading position and thereby give the operator complete freedom when tipping or moving a heavy crate or barrel.



¶A few weeks ago a huge aeroplane carrying 35 passengers flew to Paris and return from a point 40 miles distant.

VARIOUS ACTIVITIES OF BOYS AND GIRLS,



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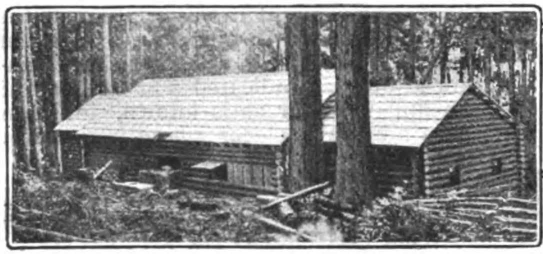
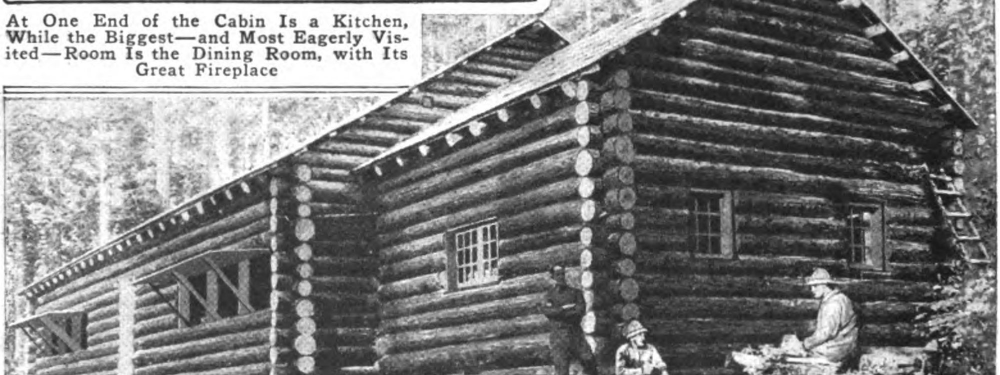
Little Children in Japan are Wonderfully Devoted to Their Dolls, and When the Time Comes to Discard Any of Them, Something Like a Funeral is Held. This Picture Shows the Oriental Little Folk from One of the Japanese Elementary Schools Attending One of These Sad Gatherings

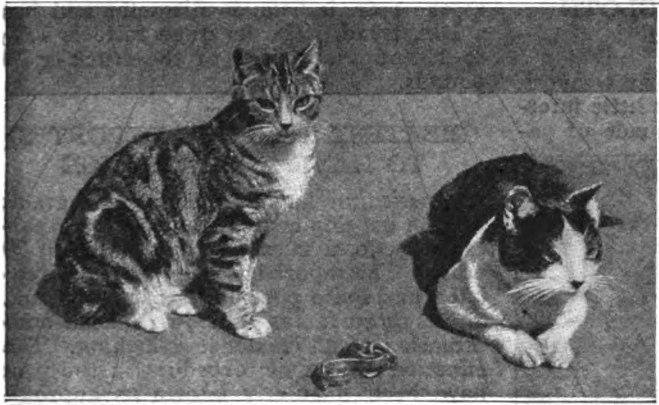


At One End of the Cabin Is a Kitchen, While the Biggest—and Most Eagerly Visited—Room Is the Dining Room, with Its Great Fireplace



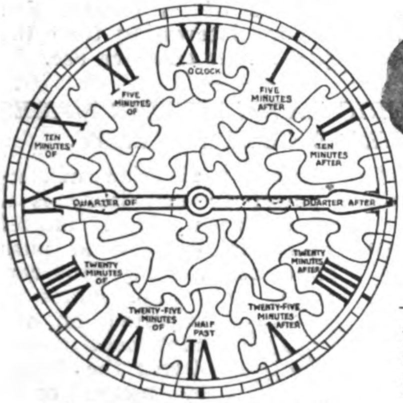
About 60 Miles from Their Home City, the Boy Scouts of Portland, Oregon, have Built This Splendid Log Cabin near Wahtum Lake, on Leased Land in the Oregon National Forest. The Building Measures 100 by 50 Feet and is Made of Peeled Silver-Fir Logs. As can be Easily Imagined, It Is the Goal of Many a Memorable Hike Taken over One of Two Beautiful Trails, Which are Maintained by Forest Rangers

AND UNUSUAL SCENES OF INTEREST TO THEM

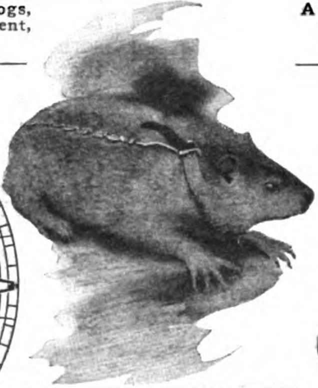


There Is No Accounting for the Taste of Cats. Here Is Tommy, for Example, a Perfectly Nice Connecticut Puss, Who Went Out One Day and Brought Back a Snake for the Entertainment of His Tiger-Striped **Daughter, Milly. Tommy's Master Believes** That the Family Pet Started Out to Get Frogs, but, Coming upon This Snake by Accident, Simply could Not "Pass It Up"

The Closest Call the Snake Ever Had: Milly Put Her Teeth into Him **a Little Way, but did Not Like the Taste, and So, after Giving Him an** Awful Scare, Let Him Crawl Away, Scot-Free



A Jig-Saw Puzzle That will Help a Child to Learn to Tell Time: On Each Piece is Shown the Value, in Minutes, of the Accompanying Numeral



A "Close Up" of Steve's Ground Hog, Which, He Says, Sleeps through the Winter until Ground-Hog Day, When He Comes Out to Look for His Shadow

In Rocky Hill, Connecticut, Everybody Knows Steve Reduker, the Boy Who Lost One Leg Over Three Years Ago, and They Like Him for His Pluck and Love of Pets, One of Which, His Ground Hog, is Shown with Him

This Little Pig Never "Went to Market" or "Had Roast Beef," but He did Have Something He Liked Much Better, Namely, Milk from a Cow Which Nursed Him

GERMAN WAR-TIME CLOTH MADE OF PAPER

A war-time product of German weavers, reports of which excited not a little interest, was the so-called cloth made of paper. Photographs recently secured of specimens of this fabric show that it is very coarsely woven, the threads appearing to be as large as coarse wrapping twine. In some cases a pattern was printed or stenciled on the material. Undoubtedly a great deal of experimenting was necessary to make possible the production of even this rather crude cloth.

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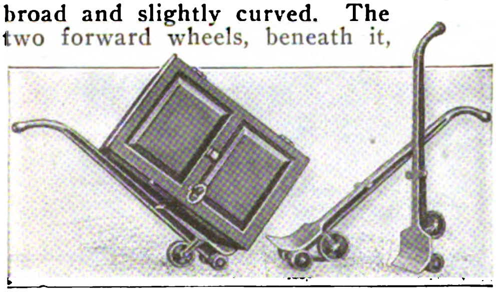
Specimen of a Substitute for Cloth Made by German Weavers during the War

NEW ALL-METAL HAND TRUCK A PINCH BAR ON WHEELS

A new hand truck for moving light or heavy loads with comparative ease resembles a large-size pinch bar, mounted on three wheels. The truck is made entirely of malleable cast iron, and there are no bolts or other parts apt to need replacing. The lower end, which is inserted under the article to be lifted, is broad and slightly curved. The two forward wheels, beneath it, have 2½-in. treads and are 3½ in. in diameter, while the third wheel, a few inches to the rear, is 5 in. in diameter and has a 1-in. tread. The leverage ratio is 13½ to 1, and the weight of the truck is 34 pounds.



All-Metal Hand Truck Made Like a Pinch Bar: It will Stand Alone Vertically or at an Incline

GREATEST TORPEDO REPORTED TO HAVE 20-MILE RANGE

America of late has been given credit for the development of the world's greatest torpedo, a missile with a range of 20 miles. The report has been widely circulated and quite possibly is based on fact, although so far as is known official confirmation of its existence is lacking. The effective ranges of torpedoes in the past have been popularly known as approximately five miles for the largest size, and about three miles for others. The use of a torpedo against a target beyond the range of vision obviously would entail serious difficulties. Therefore, granting that a 20-mile torpedo has been placed in service, the details of its construction could be no more interesting than the means employed for its effective use.

ELECTRIC LAWN MOWER MAKES GRASS CUTTING EASY

One of the newest applications of electric motive power to machinery is a motor-driven lawn mower which is as easy to push about as an empty baby carriage. A ⅙-hp. motor is mounted on the implement and drives the blades by means of a belt, but does not propel the mower. Current is obtained through an extra long flexible cord connected with the nearest socket. The motor drives the cutting machinery while the operator pushes the implement about.

APPLE BARRELS PROVIDED WITH GLASS TOPS

An innovation at a recent apple display held under the auspices of the Illinois State Horticultural Society was the glass tops in the apple barrels. The glass used was thick and was held in place by nails in the usual way. These transparent tops made it very convenient to inspect the fruit whether the barrels were placed on end on the floor or piled in rows on their sides.

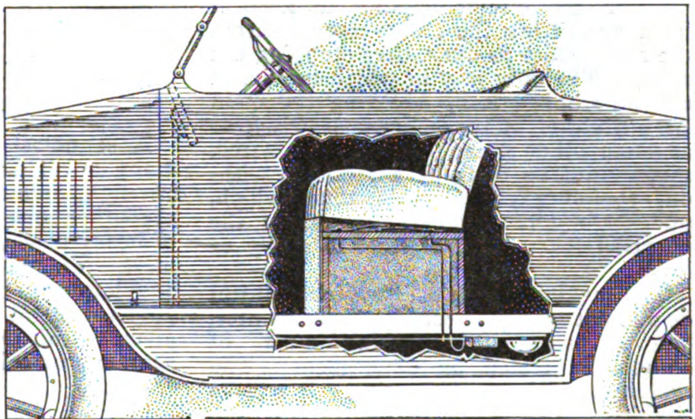
Automobile-Thief Alarm

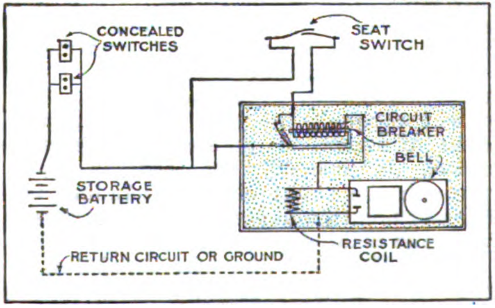
By E. W. RANSTON

MANY good and efficient automobile locks have been called into existence by the epidemic of automobile thefts, and there is now no excuse for leaving a car unprotected. The locks in general use are of several classes, each presenting its own advantages and open to its own objections. Electrical locks for merely breaking the ignition circuit were the first on the scene, and are still used to some extent, although no expert automobile thief would be delayed by them for more than a few seconds, as he would simply connect around the "lock" with a wire leading directly from the battery to the igniter. Gasoline-line locks are useful, but somewhat complicated in their installation, and introduce the questionable element of additional opportunity for gasoline leakage. Probably the favorite method is a purely mechanical lock, on the steering gear, the starting crank, or some other essential part of the mechanism.

While all of these locks may be relied upon to prevent or at least delay considerably the work of the thief, few, if any, of them are of any assistance to the police in capturing the would-be thief. The device here described is intended to accomplish this purpose, and at the same time furnish a protective device with all the convenience of the ignition lock.

The effect of the contrivance is that, when a thief enters the car and takes his place in the driver's seat, an invisible alarm bell under the car starts ringing, and continues to ring even after the thief leaves his seat and seeks safety from the police or citizens who are sure to be attracted by the noise of the bell. The bell will continue to ring until the owner returns to the car, or until somebody finds the hidden control switch and turns it off. Of course, if the thief is ingenious enough to find this switch at once, he can turn off the alarm himself, but there is small chance of a thief working very long around a car to the accompaniment of a loudly clanging bell.





As the Thief Takes His Seat at the Steering Wheel, He Sets Going an Invisible Alarm Bell, Which Continues to Ring Until Switched Off by a Concealed Switch in Another Part of the Car

The various parts of the circuit and their connection are shown in the diagram. The materials needed are: one or more small switches to be concealed as well as possible within reach of the driver; a good, loud electric bell; a relay, or circuit breaker, such as is used on nearly all modern automobiles to connect the generator to the battery when the proper speed is reached; some resistance wire, large enough to carry several amperes of current, and some pieces of wood and spring brass to make the seat switch. As will be noted in the circuit diagram, when the concealed switch is closed and the seat switch is afterward closed, the circuit through the bell is established, and, at the same time, the current flowing through the circuit breaker closes a circuit which connects around the seat switch so that, even though the latter is open, the bell continues to ring. The resistance coil would not be necessary if the circuit through the bell was continuous. Since, however, it is interrupted at each tap of the bell, the coil is necessary, in order to maintain a sufficient current through the circuit breaker to keep it from permitting the shunt circuit across the seat switch to open, thus stopping the alarm. The only way in which the alarm can be stopped is by breaking the main circuit, either at the concealed switch or at some other point. If properly wired, this cannot be done by a stranger without spending considerable time, which, under the circumstances, is out of the question for a thief, at least in a city or town.

The making of the seat switch will not be difficult for any electrical experimenter, and its successful working must, of course, be tested by experiment. The sketch may give a suggestion. It will be advisable to carry the two wires from the seat switch directly down below the car, where the circuit breaker, bell, and resistance coil can readily be mounted in one removable unit. As the current first comes through the seat switch, it will close the contact points; as the seat switch is opened, the current flows through the shunt circuit, including the contact points, and keeps the points closed until the main circuit is broken.

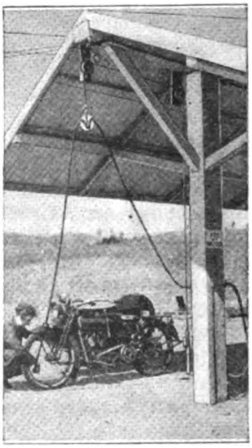
The unit under the car, consisting of the bell, circuit breaker, and resistance coil, will have two wires leading from it: one to the seat switch and one to the concealed switch. If the car is wired on the double-wire system, there will also have to be a return wire to the battery. With the grounded-battery system, there is simply a connection from the unit under the car to some screw or nut on the frame of the car.

The concealed switch may be located in a pocket on the door, just behind the dash board, under a corner of the floor mat, or any other place where it will be out of sight; or it may be built into a combination, or key, lock. Ignition locks designed for use with magnetos, which have a closed circuit when locked, are readily used for this purpose. One advantage to be gained by the concealed-switch idea, however, is that there is no visible indication that the car is locked, thus encouraging the thief to get himself trapped. Car owners who regard this as a disadvantage, preferring to notify the thief in advance that the car is protected, may use a lock switch. If the thief then connects across the two wires leading to it before taking his seat at the wheel, he will not have prevented the gong from giving the alarm. Using two or more concealed switches presents an additional advantage, as closing any one of them throws on the alarm, and all must be open to throw it off.

Etching on Glass and Metal with a Sandblast

A sandblast may be made use of in many novel ways. Any part of an electric-light bulb may be frosted by covering the other part of the glass with a piece of heavy paper, and exposing to the sandblast. A similar process will serve to etch any lettering or design on any glass or polished-metal article, and a finish may be given to soft wood which gives it the appearance of being hand-engraved.

Weight and Pulleys Keep Air Hose Convenient and Reduce Wear



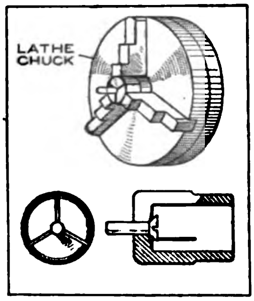
The usual air-hose arrangement about garages and service stations is frequently a source of annoyance to both motorists and attendants alike, and when the hose is dragged about on the ground, it is very short-lived. The weight-and-pulley mounting, illustrated in the accompanying photograph, keeps the hose up out of the dirt at all times. Its position is convenient for getting at all four wheels of a car; it is in the shade, and is not needlessly worn by being dragged out over the ground or left in a position to be run over by machines. This type of hose support costs little to install, and will pay for itself many times by the convenient service it renders and the reduced wear on the hose.—John Edwin Hogg, Alhambra, California.

Moving "Rusted-In" Screws

Steel screws which have rusted into place are difficult to remove. They can often be loosened by tapping the screwdriver with a hammer, or by heating, but a better way is to treat them before setting them in place with a rust preventive. Common oil will do this to a slight extent, but a mixture of graphite and tallow rubbed onto the screw, will be effective for a much longer time.—S. Leonard Bastin, Bournemouth, Eng.

Holding Screws While Threading or Turning Them

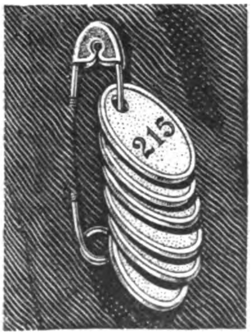
When small screws must be turned or threaded in the lathe, time is often lost because no chuck is at hand which fits the screw. A collet, to be held in the chuck, and to hold securely the size of screw for which it is designed, is made from a piece of round steel. It should be about 1⅛ in. in diameter, and its length should be somewhat greater. Drill a hole clear through it, the size of the screw to be held; then, from one end, ream this with a ¾-in. drill, to within ¼ in. of the other end. Turn down slightly the half of the piece from which the ¾-in. hole was started, so as to provide clearance. With a hacksaw, saw three or four slots, as shown, so as to form a spring collet. The number of slots should be the same as the number of jaws in the lathe chuck. The collet may be hardened, or casehardened if convenient, and its life will then be much longer. If the collet is accurately made, a universal chuck will be satisfactory to use with it; for extreme accuracy, however, which is often necessary in small work, the chuck with independent jaws is to be preferred.—E. L. Howard, Springfield, Ohio.



Large Kettle Inverted over Soft-Coal Fire Saves Heat

On putting fresh soft coal into a stove, an intense smoke is given off, which fouls the pipes and spreads soot over the room, besides wasting coal. A means for diminishing this was found in a large iron pot. The pot was provided with a ring on the bottom, by means of which it could be carried on the end of the poker. Immediately after putting on fresh coal, the inverted pot was set on top of the fire and was found to have the effect of causing the smoke and coal dust either to collect inside the pot or to escape around the edge, where the gas would burst into a ring of flame, consuming much of the coal dust, which would otherwise be wasted. The kettle is left on until the fresh coal becomes hot and is reduced to coke by having the gas roasted out of it; the pot is then removed, leaving a coke fire, which burns and lasts very well.—A. S. Thomas, Amherstburg, Ontario, Can.

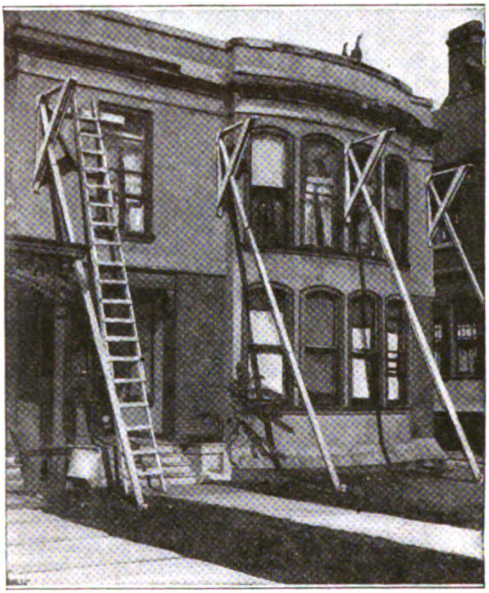
Carry Tool Checks on a Safety Pin



In shops where each workman has a number of tool checks bearing a number, one of which he deposits in the tool room as a receipt for a tool taken out, the loss of these checks may sometimes involve unpleasantness. A safer way of carrying them than in the pocket is to sew a large, strong safety pin to the overalls or shop clothes and hang the checks upon it. The checks can be removed or replaced with either hand, so that the other one is left free for carrying the tools.—C. C. Spreen, Detroit, Mich.

Scaffolding without Nails

On a repair job where the scaffolding could not be attached to the side of the house, and it was not desired to build up a whole structure from the ground, a contractor designed a number of brackets, which enabled him to get at the work conveniently and safely after very little preparation. The brackets were made of 2 by 4-in. scantlings, each brace consisting of two pieces nailed together so that the central portion, where the greatest stiffness is required, is full 4 by 4 in. The braces fit snugly into the brackets, and the whole scaffolding can be removed in a few minutes and carried to another job.—W. K. Crosson, Detroit, Mich.



Brackets for Scaffolding Supported by Long Braces Reaching to the Ground are Found Useful on Repair Jobs

Keeping Brushes Soft with Paraffin

Keeping paintbrushes soft by placing them under alcohol, turpentine, or other such liquids, is a somewhat expensive method, especially when the brushes are to be out of use for long periods. If a brush which is still moist with paint or shellac is dipped in melted paraffin several times, so that a heavy coat of the paraffin adheres to it, the brush will retain its softness indefinitely, the paraffin preventing any evaporation. To remove the paraffin, merely pull it off; it will come easily, leaving the brush as fresh as when the paraffin was applied to it.

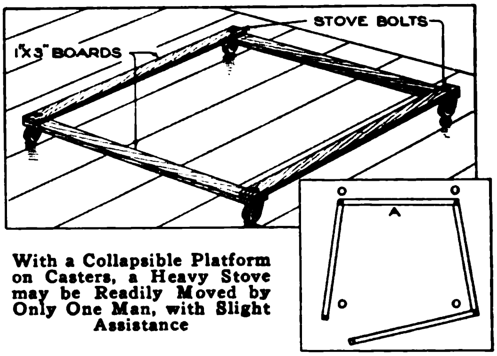
Keep the Lamps Clean

A simple explanation of a gradually failing light in many shops is to be found in that lamp globes and shades are not kept clean and, therefore, do not transmit or reflect the light properly. A little attention to keeping the lamps clean will often enable a shop to avoid the necessity of installing more lights or to have much better illumination with those already installed.—William Philip, Bloomfield, N. J.

Small Truck Aids in Moving Stove

Here is a device that is cheap and easily made, and will enable one grown person, with the help of a child, to move quite a large stove. The frame, of strips, 1 by 3 in., is bolted at three corners with ¼-in. stove bolts, and casters are fastened beneath with screws. In the fourth corner the bolt is first put through the upper board only, and the nut put on to hold it firmly in place. The platform should be made the proper size so that the stove legs may rest on the corners right over, or slightly to the inside of, the bolts. If this is not done there will be some trouble in putting the stove in place.

To use, have the loose corner open, and place the frame near the stove legs. Tip the stove forward so that the strip A may be put into place beneath the back legs. Then, lifting the front, draw the frame together and into position. The bolt in the top strip should drop into the hole in the lower one, and be fastened with a nut. Now the stove may be wheeled into the exact position desired, and by reversing the directions given above may be quickly unloaded. It is better to load the heavy end first and unload it last. Through the summer it will do no harm to let the stove stand on this truck. The casters should turn readily in any direction. Good ones can be purchased at five cents each.



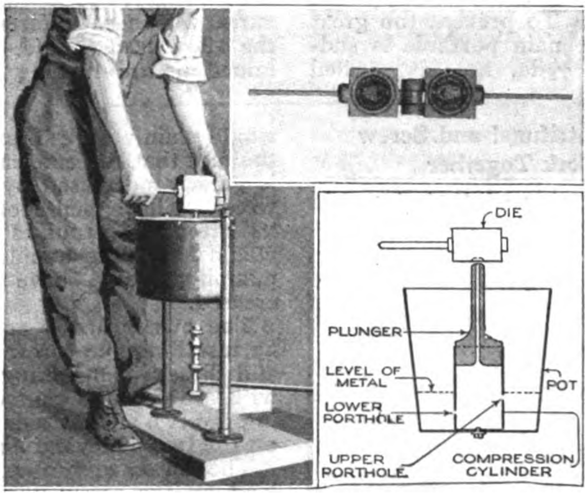
With a Collapsible Platform on Casters, a Heavy Stove may be Readily Moved by Only One Man, with Slight Assistance

A Homemade Die-Casting Machine

By C. M. MAHOOD

ONE of the interesting processes which have been introduced recently in quantity-production factories is that of making quite accurate finished castings without machining, by the process known as die-casting. In this process, the melted metal is forced into dies under pressure, and after it has cooled, the dies are opened and the finished castings removed. It is thus possible to cast parts which have the "particular" dimensions accurate to the thousandth of an inch, or even less. The metals used are alloys of fairly low melting points, as it has not been found practicable to make dies which would stand up under the temperatures necessary for casting iron or steel.

While die-casting is more particularly a factory process, yet, for certain jobs, it is entirely possible to use to advantage some methods of die-casting in the small shop. Whenever a considerable number of small parts have to be made which do not have to be of great strength, but should be accurate, the method of casting the parts directly to the finished shape should at least be carefully considered.



A Die-Casting Apparatus for the Home Shop: To the Left is Shown the Method of Making the Castings. The Smaller Photograph Shows a Type of Die for Casting Disks, and the Sketch Shows the Construction of the Apparatus

The apparatus herewith illustrated, which is almost entirely homemade, enables anyone to apply, in a somewhat crude way, the die-casting process. An ordinary iron kettle forms the pot in which the metal is melted, while two pieces of ¾-in. iron pipe, with two caps and two floor flanges, form the uprights which support it. These are set up and given a coat of stovepipe enamel. If the metal used is one having a fairly high melting point, so that the pot becomes excessively hot, a sheet-iron jacket may be placed around it, extending to the floor and inclosing the gas burner, gasoline torch, or other means of heating.

To the bottom of the pot is riveted a steel cylinder, which has an inner surface quite accurately machined. An old automobile cylinder, if not too badly worn, will serve, and the plunger may be made from the automobile piston, or machined from a very simple iron casting. The plunger is suspended by a wire loop tapped into it just beside the stem, and a cord runs from this loop to a lever, at the other end of which is a spring for the purpose of counterbalancing the plunger and automatically raising it, so as to clear the upper porthole. This hole, or slot, is about 1½ in. wide and ¼ in. high, and forms the main entrance for the metal from the surrounding pot. The level of the metal should be kept just above this porthole. A small porthole, about ⅛ in. in diameter, is also made near the bottom of the cylinder. Up through the stem of the plunger runs a ¼-in. hole, and the top of the stem is turned off to fit any standard countersink, which will be used in countersinking the sprue hole in the dies.

The dies are made in any of several ways. If one wishes to go to the expense of getting a high-quality die for long service, it can be ordered from a commercial die sinker. For certain types of parts, the die can be made by pouring out two pieces of cast iron and fitting them with dowels and wooden handles, and finishing the die inside with plaster of Paris. Such a die is readily made and is useful for short, rough runs.

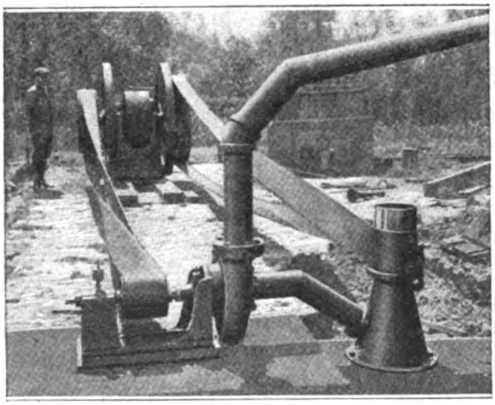
The operation of such an apparatus is as follows: Fill the pot with metal to a height slightly above the upper porthole, and heat the metal to 100° or 200° F. above its melting point, in order to offset cooling in the stem of the plunger. Heat the die with a blowpipe flame before making the first casting; after the run is started, the die will be sufficiently heated by the hot metal, and in the case of large parts may even have to be cooled somewhat between operations. Lubricate the die with beeswax; then close it, place it on top of the stem, with the end of the stem in the sprue hole, and press down upon the handles of the die. The metal will be forced into the die by pressure sufficient to form it for fairly accurate work. Remove the die at once, and as soon as the metal has had time to cool, open the die, throw out the part and proceed to make the next one in the same way. For small, thin parts, the time required for solidifying the castings will be found almost negligible, and the parts can be made as fast as the die can be closed, opened, and pressed down on the stem of the plunger.

As the plunger comes down, it at first forces metal out through the upper porthole; when the lower end of this is reached, the metal is forced upward through the stem. To prevent too great a shock when the main porthole is suddenly closed, the ⅛-in. hole is drilled farther down, which has the effect of diminishing the suddenness of closing the main porthole. The slight amount of metal which will flow out through this lower porthole will not prevent the flow to the die, as the action must be rapid.

Metals for this process are of various composition. Tables of alloys, having various properties, can be found in mechanical handbooks; the cheaper metals are those having a lead base, and have very little strength, though they are entirely practical for some purposes. The metal known as stereotyper's metal, composed of lead, tin, and antimony, melts at about 550° F., and is a useful metal for this class of castings. Where a harder product is desired, alloys with a zinc base and from 10 to 30 per cent each of copper and tin may be used. Shrinkage also varies for these different metals; that of the alloy used should be carefully ascertained before making any accurate die.

Pumps of Centrifugal and Screw Type Work Together

Tests of a well showed that it would furnish a large amount of water, but that a heavy lift would have to be overcome to get the water to the surface, when it would have to be lifted an additional 50 ft. into a large storage tank.



The Screw Pump Raises the Water to the Surface, and the Centrifugal Pump Then Takes Hold and Throws it Up to the Storage Tank

It was clear that for such a heavy head, a centrifugal pump would be best. On account of the limited suction capacity of such pumps, however, it was also evident that a deep and expensive pit would have had to be built.

On the other hand, one of the new type of screw pumps, made to fit the casing of the well and sunk below the suction limit, would plainly have been indicated but for the fact that the efficiency of such pumps is greatly decreased by a heavy head of water. The expense of the pit, with all its attendant troubles and annoyances, would have been avoided, but the cost of pumping would have been greatly increased.

The owner finally solved the difficulty by installing the screw pump in the well and directly connecting it at the surface with a horizontal centrifugal pump, placing the two side by side and running both off the two pulleys of his engine.

The outcome proved him right. The load on the screw pump is relieved, before the water reaches the surface, by the centrifugal pump, which lifts it from there on the additional 50 ft. into the tank, and the centrifugal pump does not have to exert its limit of suction to take in the water.—Henry Simon, Laguna Beach, California.

Staining Wood a Dark Color with Roofing Cement

When a dark-walnut flat finish is desired on woodwork, one may use the cement which is furnished with rolls of composition-roofing material. To use this cement for a stain, work it sparingly into the wood with a lintless cloth, or small varnish brush; if any surplus cement remains, take it off with the cloth. The results obtained with this novel staining material are declared to be very satisfactory.—H. K. Capps, Stahl, Mo.

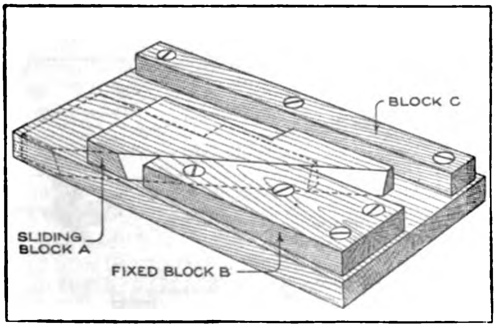
Groove Plane Made from Rip Saw

It will often be found on an old rip saw that the teeth near the handle remain quite sharp, although the teeth near the center of the saw are entirely worn out. If the saw is cut or broken off 8 or 10 in. from the handle, the short saw thus formed can readily be mounted with a few wooden blocks to form a groove plane. By giving the teeth a pronounced set, the groove cut may be made somewhat wider, if desirable.

A Bench Stop Which Clamps the Work

Ideas without number have been brought forth for bench stops and similar devices to hold work on the bench while planing or chiseling. All of them have their own virtues, but few have the property of clamping the work tightly when it is pushed into or against them.

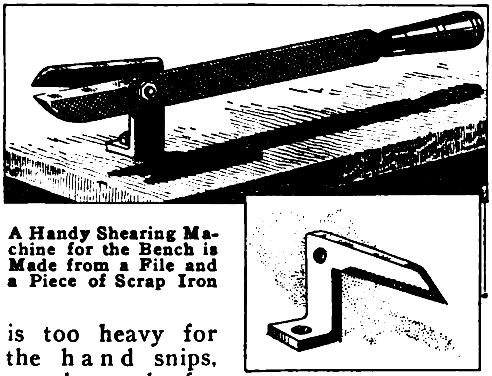
A stop which has this property to an excellent degree and yet is simple of construction, is here illustrated. It consists of a sliding block, A, with one edge cut to a bevel, as shown; a fixed block, B, which also has one edge cut to a similar bevel, so that the edges of A fit against it and the straight block C. Blocks B and C can be fastened to the bench directly, or to a block on top of the bench. The notch opposite the bevel edge of block A is made of such size that it will take a certain range of jobs. Any number of blocks A can be made, each having a different shape and notch, and each taking a certain range of work. The work is inserted in the bench stop by simply laying the end of it in the notch in the block A and pushing it forward, so that the work is wedged in between A and C. It is loosened by merely striking a blow on the small end of block A.—E. K. Wehry, Cedar Rapids, Ia.



A Simple but Efficient Bench Stop: As the Work is Pushed Forward into the Stop, the End of It is Firmly Clamped without Marring

Bench Snips or Shears

Very handy and cheap bench shears for cutting tin, or other sheet metal, which is too heavy for the hand snips, can be made for the home-shop workbench, as indicated in the drawing.



A Handy Shearing Machine for the Bench is Made from a File and a Piece of Scrap Iron

A 14-in. flat file, with one side ground smooth, and a portion of the tip and one edge sharpened, makes the movable shear knife. The fixed cutter can be forged from a part of an old plowshare, or other suitable scrap steel. The bolt hole in the file is punched while the file is at a cherry-red heat. A locknut must be used on the bolt, or else the end must be riveted.—Chas. H. Willey, Concord, N. H.

Drilling Holes through Heavy Metal with a Bit Brace

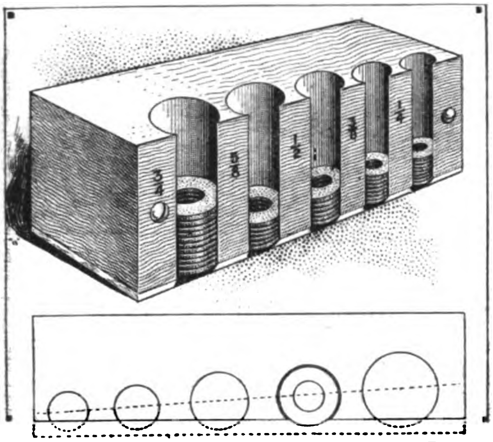
When holes of a diameter greater than about ¼ in. must be drilled through iron of considerable thickness with a bit brace, the big part of the job is to maintain the proper pressure on the drill. It will be much easier if a small hole is first drilled by means of a hand drill, of, say, ⅛ in. diameter, the hole being reamed to size with the large drill in the brace, which will then require much less pressure than without the small hole.—Chas. A. Black, Jr., Hightstown, N. J.

Universal Lathe Chuck Used as a Vise

A universal chuck mounted face upward on a heavy wooden block is a useful type of vise for many purposes in the shop. Any job that would be held in the chuck for lathe work can be held similarly in this vise, and is then ready for any handwork, such as laying out, filing, or scraping.—H. S. Hart, Shreveport, La.

A Rack for Washers

Workmen who have frequent use for plain washers of various sizes, and who like to keep them handy so that they can be picked up and put into place as quickly as possible, may find it convenient to make a rack like the one shown in the sketch. It is made from a single block of wood, by boring holes slightly larger than the respective diameters of the washer to be used. The line on which the center for these holes is laid out should be slightly out of parallel with the edge of the block, and should be located so that the largest hole to be made will not meet either edge of the block. Then, after all the holes are drilled and a piece of cigar-box, or other thin, wood is attached to form a bottom, plane off the block, so as to expose the holes from the side. The washers can be stacked in the rack by simply dumping them in and shaking the rack about.



The Washers Are Always in Sight, and cannot Rattle Loose. The Rack is Easily Filled, and One or More Washers are Easily Removed with the Fingers

Enlarging Pistons by Peening to Eliminate Slap

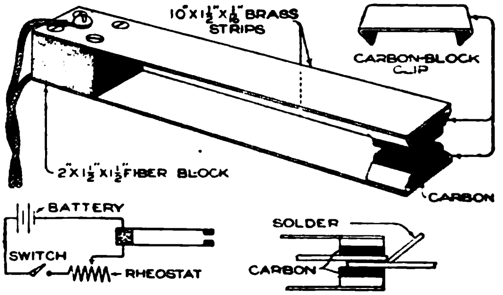
When an automobile piston is found to be "slapping," due to the skirt being too small, one way to remedy the trouble is to remove the piston from the connecting rod, lay it upon its side on an anvil, and strike a succession of blows with a ball-peen hammer on the inside of the skirt. The blows should be light and very even, and uniformly distributed. The piston should be accurately calipered to see that the enlargement is proceeding properly and that the peening is not bending the skirt slightly out of round. A piston thus treated, fitted with good-quality piston rings, will often give satisfactory service where oversize pistons would otherwise have to be fitted.

Electric-Soldering Tongs

Simple soldering jobs, such as splicing wires, fastening cable leads to terminal clips, or sweating metal plates together, may be quickly and neatly done with electric-soldering tongs. The parts to be soldered are brought almost instantly to the correct heat, which is not possible with the ordinary soldering copper.

Two spring-brass strips, 10 in. long, 1½ in. wide, and at least 1/16 in. thick, are used to carry the electric current to the carbon electrodes as well as to form the tong handles. Form two brass clips of such dimensions that they will each hold a piece of carbon, 1 by 1 in., by ½ in. thick. Rivet them to the end of the brass strips; a good job of riveting must be done, and the clips must seat snugly against the strips so that a good electrical connection is assured. Saw a block of fiber 1½ by 2 in., by 1½ in. thick. Drill small holes in the free ends of the strips so that the latter may be screwed to the fiber block, parallel and insulated from each other. Provide electric wire connections to the brass strips.

The tongs must be operated from a low-voltage circuit, and for most shops the storage battery will best meet this requirement. For temperature regulation during soldering, a variable resistance or rheostat should be used to decrease or increase the flow of current. To solder, it is only necessary to grasp the piece or pieces to be worked on between the carbon electrodes by using the device like a pair of tongs. The instant an electric circuit is established between the carbons the latter should come to a red heat, and soldering is the work of but a few moments.



The Electric-Soldering Tongs Operate on a Principle Similar to That of Electric Welding, the Heat being Due to Passage of Heavy Current through the Work

If desired, the brass strips may be

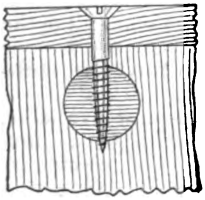
wrapped with friction tape for convenience and safety in laying the tongs down; it is not necessary for protecting the hands, if the rheostat is wound noninductively.—Kenneth Coggeshall, Webster Groves, Mo.

Soldering Paste Carried on Torch

A handy way to carry soldering paste, when working on poles or ladders, is to solder a piece of 1½-in. square brass tubing, about 3 in. long, with a bottom soldered in it, to the side of the blowtorch. Fill it with paste, and it will always be handy when wanted.—E. C. Galbreath, Denver, Colo.

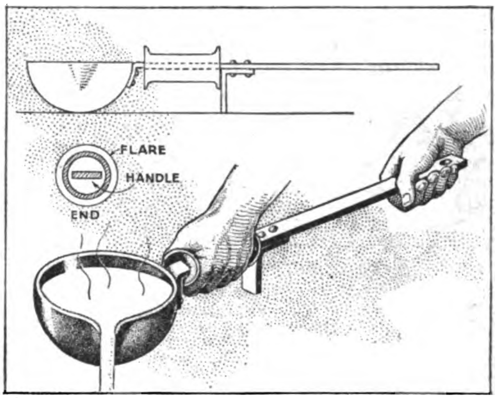
Making Wood Screws Hold When Parallel to Grain

Wood screws inserted into the end of the grain, especially of soft wood, do not take a very strong hold. The hold may be improved by backing out the screw after it is inserted, placing a small amount of glue in the hole and then reinserting the screw. When screws are to be taken out repeatedly and reinserted into the end of the grain, as is often necessary where work is required to be taken apart in the foundry, simply screwing them into the end of the grain should not be depended upon. In such cases, insert at right angles a hardwood plug, as shown, and allow the screw to pass through it. When the screw will no longer hold in consequence of its repeated withdrawals, the worn-out plug may be taken out and a new plug inserted.—Ernest Schwartz, Brooklyn, New York.



Improving an Old Ladle

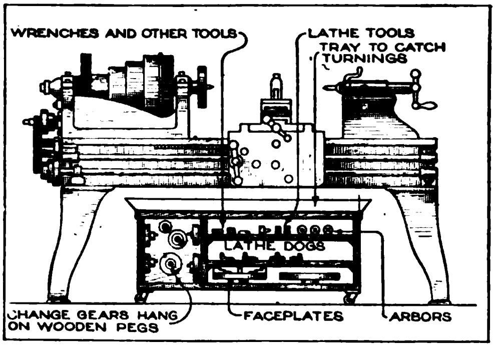
Small ladles for pouring babbitt or lead can often be improved as shown in the sketch. A piece of tubing, about 5 in. long and flared out at both ends, is slipped over the handle. A piece of steel, bent to a right angle, is then riveted onto the handle, back of the tube, serving the double purpose of holding the tube on and of forming a leg so that the ladle can be set down, if required, without tipping over. In order to serve its purpose well as a leg, this piece of steel should be at least 1 or 2 in. wide. By gripping the tube handle with the left hand and tilting the ladle by gripping the end of the long handle, with the right hand, the metal can be poured quite readily. Hold a piece of folded cloth, or soft asbestos, under the left hand around the grip, so as to protect the hand from the hot metal surface.



A Steel Leg, and a Grip of Metal Tubing over the Handle, Make the Old Ladle More Convenient in Use

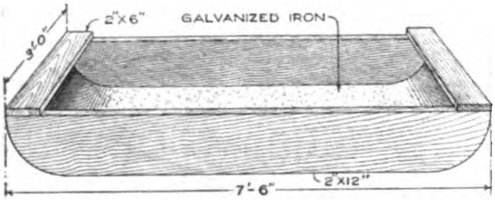
Neat Chest under Lathe Holds Tools and Gears

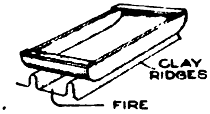
The chuck and faceplates of a lathe in many shops will be found either on the floor or hanging somewhere about the legs of the lathe. The drawing suggests a means of keeping the chuck, faceplates, dogs, and gears neatly where they can always be found, and of having the drip pan in a proper position at the same time. The tray may be removed from the box to dump out the oil and chips from the lathe, and the entire box can be rolled out on its casters when sweeping the floor.



A Chest Placed under the Lathe Carries the Drip Pan on Top, and Has Shelves and Hooks for the Lathe Tools and Accessories

Vessel for Cooking Potatoes for Hogs on the Farm





A Large Cooking Pan for Use on the Farm may Consist Partly of Wood. It is Used in Such a Way That the Wood is Protected from the Fire

It is not necessary to feed raw cull potatoes to hogs just because there is no cooker on the farm. One 16-ft. plank and a sheet of galvanized iron, together with a few nails, will make a good, serviceable cooking pan that will last all winter if it is used carefully.

The plank should be 2 by 12 in., and long enough to be cut in two pieces, 7 ft. 6 in. long. The two pieces are rounded at both ends, sled-runner fashion, and made square and smooth on the edges with the plane and drawshave.

The galvanized iron should be No. 24 gauge, or thicker. It should be 3 ft. wide and 8 ft. long. It is thoroughly nailed to the edges of the planks with eight-penny wire nails. The cooker is finished at the ends by crosspieces of wood to protect the edges of the galvanized iron and stiffen the frame.

To use the cooker, it should be placed on two ridges of clay, made level and plastic with water so the cooker fits down tight all along both sides. The fire is made near the windward end, so the draft will carry the heat under the whole length of the cooker to get the full benefit of the fuel.

There should be enough water in the cooker to boil the potatoes soft without burning. Just before the cooking is finished, let the fire die down, and dip all surplus water out so the mass of potatoes will steam dry, just as in cooking potatoes for household use.

This heating pan may also be used to heat water for scalding pigs at killing time.

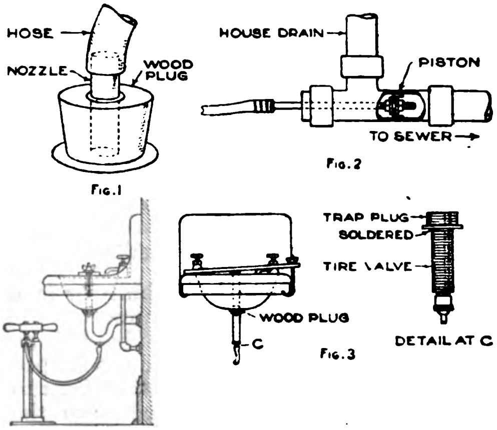
¶Rubber cement is good for patching clothing. Use according to directions given for rubber; pressure with a hot iron will vulcanize the job if desired.

Cleaning Out Clogged Drains with Fluid Pressure

In many cases the handiest way to clean out drain pipes which have become clogged with dirt, is by means of water or air pressure. It is, of course, quite common to use the nozzle of a hose, thrusting it down through the drain and turning on the water under high pressure, this method being used often in cleaning out sewer outlets in city streets. The objection to such procedure is that the water backs up into the sink or washbowl. This can be prevented by making a taper plug of wood, as shown in Fig. 1, which can be fastened on the hose nozzle and thrust into the drain inlet so as to prevent the possibility of the water backing up.

Another way to prevent the backing up of water, which is useful in places where the above method would not be practicable, is to make, on the end of a piece of ¾-in. pipe, a piston of proper size, as in Fig. 2, to be pushed into a large drain pipe which has become clogged. To the other end of the piece of pipe the hose is attached, and water is then forced in without danger of backing up.

Where water pressure is not available, it is possible to use air pressure as furnished by an automobile-tire pump, as shown and detailed in Fig. 3. One way to do this is to unscrew the plug at the bottom of the water trap below the washbowl, and solder into this plug an automobile or bicycle-tire valve. Then, if the bowl outlet is tightly plugged, air can be forced in at a pressure high enough to dislodge the dirt which causes the congestion.



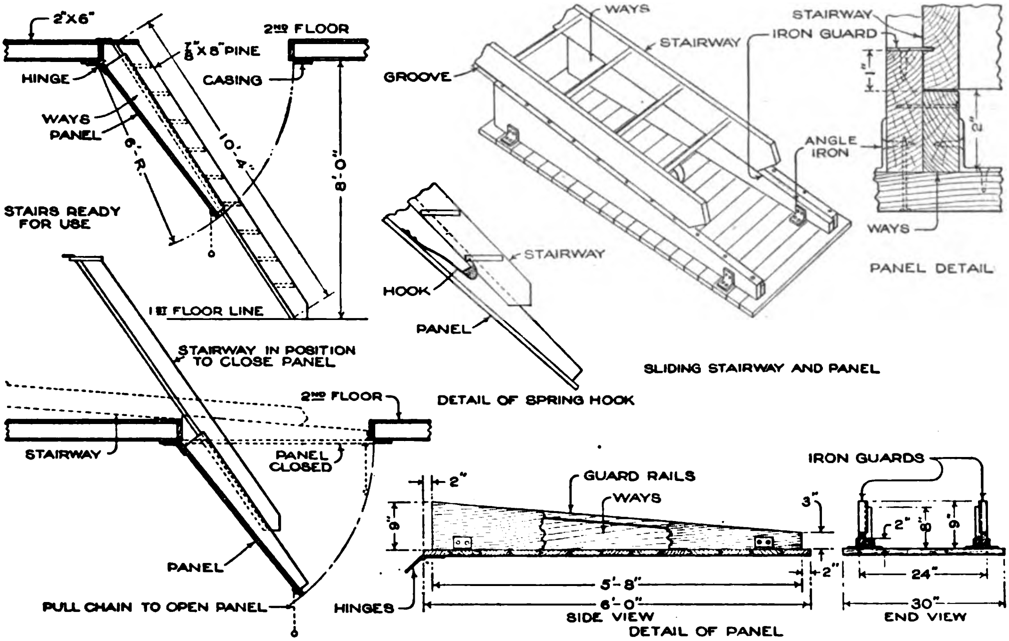
One of These Devices for Forcing Fluid Pressure into Stopped-Up Drain Pipes may Often Save Much Time and Expense

A Disappearing Stairway

By L. B. ROBBINS

A STAIRWAY which can be quickly and easily disposed of so as to give needed floor space in the bungalow, or small cottage, is a thing generally much desired. Such stairs are not at all difficult to construct.

As will be seen in the sketches at the left, the stairs are hung in an opening, or well. This should be cut 6 ft. long, between two adjacent rafters. It is then boarded in on the sides and ends, the boards coming flush with the ceiling of the room. A casing of 6-in. boards should be laid around the edge of the well, so that the edges of these boards will just meet the edges of those inside the well.



A Stairway Which is Lifted Out of the Way in a Few Seconds: It Is Only Necessary to Slide the Stairs Upward on the Ways Until They Catch on the Spring Hook, and Let the Panel Rise Flush with the Ceiling. A Corresponding Operation Brings the Stairway Down, Ready for Use

The swinging panel is constructed in such a way as to make a presentable appearance to the occupants of the room when it is swung up in place. It is 6 ft. long and 2 ft. 6 in. wide, supposing the rafters to be 30 in. apart. If the ceiling timbers are spaced any other distance between centers, make the panel of a width to correspond, so it will lap over the edge of the sides of the opening about 1 in. When the well is ready for the panel it should measure 5 ft. 10 in. by 2 ft. 4 in.; the panel then sets into, and flush with, the casing.

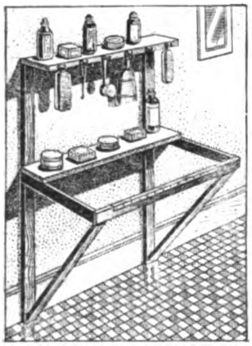
The upper face of the panel is provided with inclined ways, as illustrated to the right. Cut two boards to the shape shown for the guard rails, of 7/8-in. stock, 9 in. high at one end, and 3 in. high at the other. Then make another pair for the ways, 8 in. high at one end and 2 in. at the other. Match each pair and screw them solidly to each other, the ways inside of the guard rails. Along the top edge of the latter, screw strips of band iron, 1½ in. wide. See that this iron has straight and parallel edges, and that the outside edges are flush with the guard rails. The ends of these boards should come at least 2 in. from each end of the panel. Fasten the guard rails to the panel with angle irons. Hinge the panel at the heavy end to the casing of the well with solid hinges, and provide the free end with a chain by which it can be pulled down to put the stairs in service.

The stairs illustrated are for a room 8 ft. high; the length can be easily varied to suit the height of any room more or less than 8 ft. Cut the sides from two 8-in. pine boards of 7/8-in. stock. The longest edge, as indicated, should be 10 ft. 4 in. long to obtain a good angle for such a stairway. The bevel at the lower end is 6 in. wide, and the top bevel can be cut parallel with the upper floor by setting the sides in place temporarily and marking with a straightedge. The width of the steps should be such that the sides will fit fairly snugly down on to the ways, yet not so tight as to bind in the least. Then a groove should be cut along the outside of the sides, into which will slide the edge of the iron straps, or guards. These prevent the stairs from being pulled away from the ways. Set in the treads, parallel with the floor, and the same distance apart all the way up. It is well to mortise them into the sides about ¼ in. to stiffen the structure. Angle irons at the top and bottom steps will further prevent it from pulling out of shape. A little paraffin on the ways will improve the sliding qualities.

The stairway disappears by sliding it up the ways until the bottom is some distance above the lower end of the panel. Somewhat more than half of the stairway should project into the air and should be slightly more than sufficient to counterbalance the weight of the panel and bottom of the steps. To fasten the stairway when it is pushed to the proper height, and keep it from falling, a spring hook is provided, as shown in the detail. It works automatically when the stairway is being put away, but must be released by hand when the stairs are being lowered for use. When they are fastened by this hook, the panel tends to rise, being pulled upward by the weight of the upper end of the stairs. By means of the chain, which should have some sort of knob at its end, the panel is held as it moves into place. No catch or fastening is necessary to hold it there, as the counterbalancing weight of the stairs accomplishes this purpose.

Being a stairway which is as easy to ascend as an ordinary one, and yet taking up no more space than the trapdoor and ladder so frequently found, the construction may be very useful for reaching almost any upper story if access is not necessary in the daytime, but only at night for sleeping purposes.

Shoe Shining at Home Made Easy by Handy Outfit

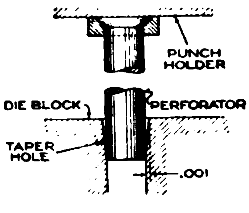


One of the needless luxuries for which Americans spend enormous sums of money is that of having their shoes shined at a public shoe-shining parlor. It is well to remember that shining one's own shoes means no loss of time, but rather a saving of time, as there is no waiting and no delay if everything is handy. A rack, such as illustrated, makes this surprisingly easy. Either foot is placed on the outer rail and all brushes and material are then within handy reach. The posture can be shifted as found convenient, to give access to the rack, and clearance for the polishing cloth.

Improvised Electromagnet Picks Wrench from Crankcase

A wrench which had been accidentally dropped into the transmission case of a car, seemed to be almost impossible to recover without tearing down part of the transmission. It was recovered quite easily in this way: A ½-in. bolt, 15 in. long, was wound with about 15 ft. of insulated copper wire, and four dry cells, in multiple, were connected to this coil. At the cost of a few seconds of ruinous service on the cells, an electromagnet was formed, so powerful that it lifted the wrench from the transmission case and saved a big job of tearing down and reassembling.—John H. Thies, Cedar Falls, Iowa.

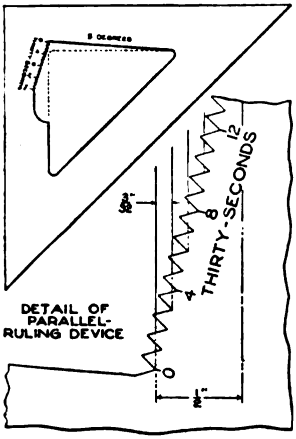
Keeping Small Punchings from Sticking to the Perforator



In perforating, on the punch press, holes in very thin stock or of very small diameter, one important source of trouble is that the punchings have a tendency to stick to the end of the perforator, and be carried along the stock to the next hole to be punched, where they do much damage. The trouble can be obviated by the use of the compound type of punch and die, but these are expensive. A cheaper method is to ream out the hole in the die to a slight taper at the top, so that it is about .002 in. oversize at the cutting edge. The perforator is made just long enough to reach down beyond the end of the taper. The punching will then be wedged tightly in the die hole, and will not adhere to the perforator. There will, of course, be a slight burr turned up around the punched hole, but this will be removed in the tumbling operation commonly performed on this class of parts.—S. B. Royal, Reading, Pa.

Useful Kinks for Improving the Draftsman's Triangle

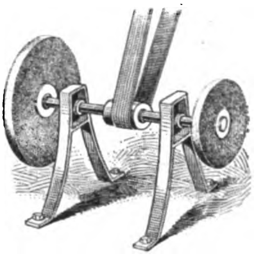
The ingenious draftsman can make on his triangle many little improvements which will facilitate his particular line of work. Two such kinks are shown in the illustration. Each shop usually has its own rule as to draft angles in castings, these being usually from 5 to 10°. One of the inside edges of the triangle may be dressed off with a knife, chisel or file to this angle; and by turning the triangle to a suitable position, one can then readily draw these lines with the proper slant.



Another useful kink is to dress off another of the interior edges to a somewhat steeper angle, and file notches of uniform depth at equal intervals along the edge. These are quite useful in section-lining and in drawing lines for lettering, as the lines are easily spaced the same distance apart. In determining the position of the notches, the triangle should be placed over two lines, which are drawn ¼ or ½ in. apart, and the part of the slanted edge which comes between the two lines should then be divided into 8, 16, 25 or 50 equal spaces, as preferred. If notches of equal depth are made at these points, then, by setting the pencil in the notches and sliding the triangle along, lines can be readily drawn at a distance from each other of any desired number of thirty-seconds or hundredths. Figures can be scratched onto the triangle, making an enlarged scale along this edge of the triangle.

Shafting Hangers Converted into Neat Bench Buffer

Many shops where the position of overhead shafting has been changed, can find use for a pair of shaft hangers, which may have been left over, to fit up a bench buffer. A short piece of shafting is mounted, as illustrated, with collars and setscrews to keep it in place lengthwise, and buffing or polishing wheels are mounted on the two ends. It is not desirable to run a heavy emery wheel at high speed on ordinary shaft hangers, as they are not built for such service, but for buffing and polishing of various kinds the arrangement does very well. The cost of construction is practically nothing, as no material need be purchased. — Ernest Schwartz, Brooklyn, N. Y.



Boiling Potatoes to Loosen Boiler Scale

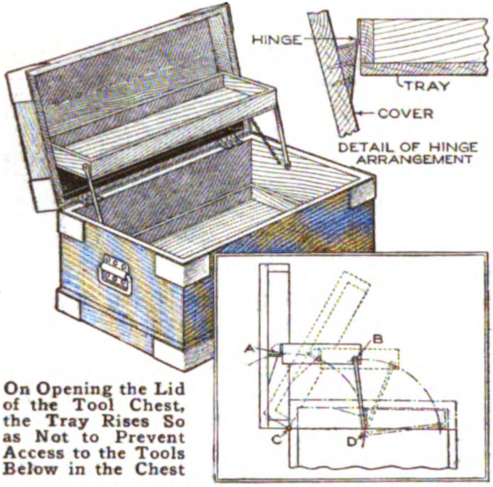
A 40-hp. steam boiler was kept clear of scale for over 20 years by the simple process of placing in it at intervals a bushel of potatoes. It was found that after these were boiled for a time, the scale loosened and collected in the bottom of the boiler, where it could be easily removed.—T. J. Hubbard, Mendota, Ill.

Sawing through Plaster Walls

When cutting an opening for a doorway through a plastered wall, the usual result is a number of cracks in the plaster, some of them projecting beyond the part to be covered by the door casing. Owing to the hair used in the plaster to make it stick together, the saw mutilates it badly, sometimes tearing out large pieces. This can be diminished by nailing two stiff boards to the plaster, with room between them for the saw, and working the saw between these two boards.—W. H. Sargent, Rutland, Vt.

Tool-Chest Tray Rises When Lid is Opened

A tray built in the lid of a tool chest, which remains level at all positions of the lid, is a very convenient place to keep small tools or articles which are used quite frequently. The tray should not be much wider than half the width of the chest, or it will be more difficult to get at the tools in the main part of the chest.



On Opening the Lid of the Tool Chest, the Tray Rises So as Not to Prevent Access to the Tools Below in the Chest

In order that the tray remain level, the four hinge points, A, B, C, and D, must form a parallelogram; that is, the distance AB must be equal to CD, and AC to BD. Since D must be below C, in order to give the screw at D a firm hold in the side of the chest, B must be set the same distance below the level of A; and because D can be only a short distance below the level of the edge of the chest, the links which support the tray should not be used to keep the lid from falling back; a chain or separate sliding link should be used for this purpose.

Readers who are interested in geometrical puzzles may find it interesting to figure out the conditions under which A and B could be placed in the same horizontal plane, with D lower than C, and still have the tray level in both open and closed positions.—Eino E. Lakso, Fitchburg, Mass.

Pocket Mirror Is Useful in the Shop

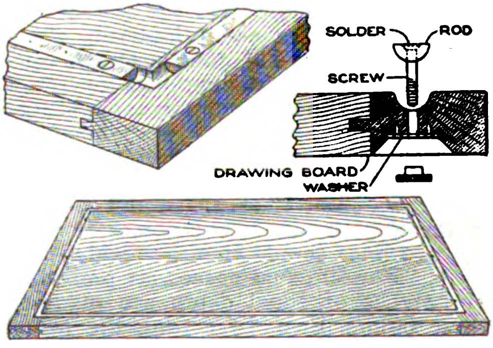
A small pocket mirror is a very handy thing in the shop. Either daylight or artificial light is thus easily reflected into a dark corner or into a blind hole. When the lamp attached to a lathe or other machine cannot be adjusted to a proper place for seeing the work, the mirror may often help out. Similarly, if a deep flask in the foundry is to be examined, a mirror is much handier than a torch.—Edwin J. Bachman, Fullerton, Pa.

Fastening Drawing Paper Tightly to the Board

When a sheet of heavy drawing paper must be held very tightly to the drawing board, a common method is to wet it thoroughly and paste the edges to the board. Then, when the paper dries, it will contract slightly and will be stretched very tightly on the board. This tension is so great, however, that unless the paste holds very firmly, the paper will be torn away from the board, and the process must be repeated.

The sketch shows a board arranged with the idea of avoiding this trouble. Four bars of half-round iron are laid into grooves, cut to fit them, around the edge of the drawing board. The sheet of drawing paper should be large enough to project an inch, or more, in all directions beyond these grooves. The corners of the sheet are then cut off diagonally, and the four edges of the sheet are forced into the grooves under pressure of the half-round bars. The bars are held down by screws, soldered into them at intervals of a few inches, which project through holes made in the board. On the lower ends are fitted brass thumb nuts, such as are used extensively in electrical work.

With this arrangement, the paper can be clamped very tightly even without wetting it; there is no reason, however, why the paper may not be wetted and then clamped with the rods, if this is found to give better results with the particular quality of paper used.



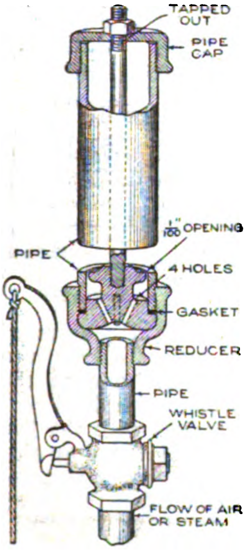
By Means of Four Bars of Half-Round Steel, with Machine Screws Soldered In, the Drawing Paper is Clamped Very Firmly to the Board in a Few Seconds

Used Oil from Auto Engines Makes Good Fuel

When the lubricating oil in the automobile engine is changed, the old oil, although it has lost its usefulness as a lubricant, still makes an excellent fuel. A good way to utilize it is by soaking it up into paper or shavings, and pressing these, if possible, into compact shapes. Care must be taken to guard against spontaneous combustion, and to protect the oil-soaked material in every way possible from fire danger.—Parke L. Shee, Oak Park, Ill.

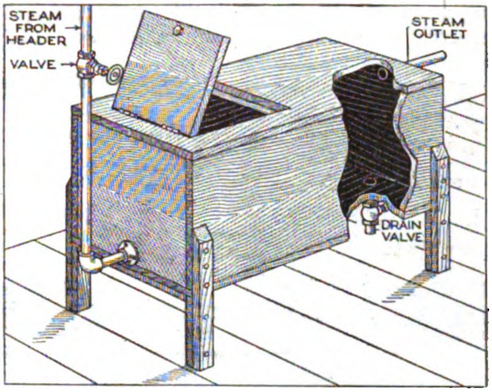
Steam Whistle Made from Pipe Fittings

A small shop, which does not require the daily use of a steam whistle, may nevertheless desire it greatly on special occasions, such as for celebration purposes. Even though steam pressure may not be available, compressed air, as maintained for inflating tires, is equally useful. A whistle can be made almost entirely from pipe fittings and scraps of iron. Only one part need be turned in the lathe, namely, the irregular part contained within the reducing coupling. It should be turned to allow an opening of not much more than .01 in. between it and the short piece of pipe by which it is surrounded. The tone of the whistle depends on the length of the upper pipe, and 3 or 4 in. will be found a useful length. The whistle valve may be purchased, or, for occasional use, some other form of valve may take its place.—Charles Springer, Detroit, Mich.



Mechanic's Clothes Laundered by Exhaust Steam

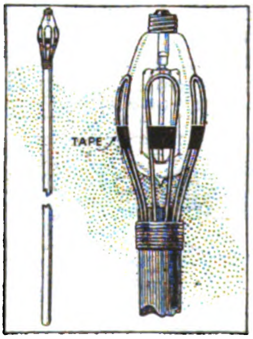
In a shop where exhaust steam was plentiful, a mechanic built a box, with a lid for closing it tightly, connected to a pipe which led through a valve to the exhaust-steam line. Soiled overalls or shop clothes are thrown into the box, and the steam is turned on. A small pipe was provided as a steam outlet, and another to carry off the condensed steam from the bottom. It was found that, after remaining in the box for a few minutes, the overalls were quite well cleaned. After removal from the box, they were rinsed in cold water, and the box was ready for the next batch.—Roy H. Poston, St. Francois, Mo.



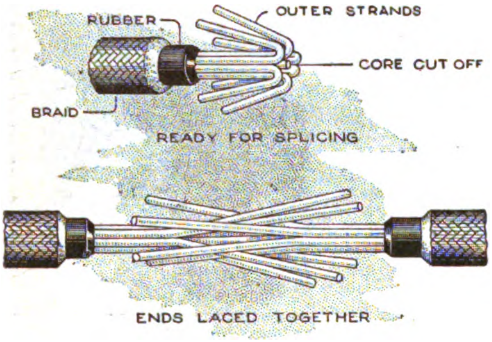
A Mechanic Built His Own Steam Laundry for Cleaning His Overalls, Making Use of the Exhaust Steam from the Shop Engines

Replacing Incandescent Lamps in Lofty Ceiling Fixtures

A useful tool, for removing blown-out electric lamps from high ceiling fixtures and replacing them with new ones, was made from a long pole with wire loops firmly attached to the end. The loops of spring wire were so shaped as to slip over the end of a lamp of the size used and hold it firmly. Each loop was wrapped, at the point where the lamp diameter was largest, with insulating tape, which created friction between the tool and the glass, so that the lamps could be loosened even if screwed in quite tightly. A tool of this character can readily be made jointed, to reach fixtures of various heights, and will save a great deal of the time otherwise spent in bringing ladders and climbing upon them to reach the lamps.—Dale R. Van Horn, North Loup, Neb.

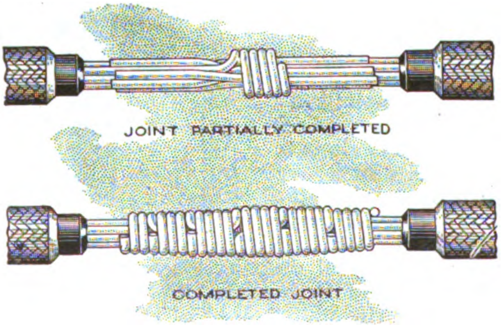


Splicing Stranded Wire



The Strands are First Bent Back, So That the Core may be Cut Off, and Are Then Interlaced

Almost any practical man can make a splice, between the ends of two stranded electric conductors, which will carry the current, but comparatively few know how to make quickly a strong splice which will have a neat, businesslike appearance. The successive steps of the process are shown in the sketches. The first step is to "skin" the wire, and sandpaper it until it is bright, removing all the rubber and other insulation from the conductor. Next the ends of the outer strands should be bent back to expose the core, which should then be cut off. The outer strands are now forced back almost to their normal position. The two ends to be connected are laced together, so that the end of each strand comes between two ends from the other conductor. Proceeding, each one of the free ends is wrapped around the main conductor, taking all strands of each conductor in their order, going around the joint, and wrapping each one around as many times as it will go. Each strand should be cut off where it meets the next strand to be wrapped, as indicated in the lower sketch, so that there will be no incomplete turns of wire.

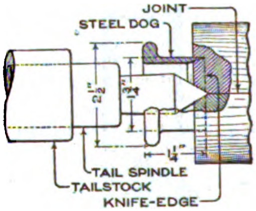


The Strands are Wound Around, One after the Other, Forming a Joint of Great Strength

To solder the joint, the molten metal should be poured with a ladle, so that it will drain into the solder pot through and around the joint, until the joint becomes hot enough so that the solder will permeate it and stick to it effectively. After the joint has thus been uniformly heated, and appears to be "tinned" over its whole surface, a wet piece of waste can be held on it to cool it quickly. Tape servings around the joint, to the thickness of the insulation of the original wire, complete the splice.—E. D. Hunt, St. Louis, Mo.

Holding Split Patterns in the Lathe

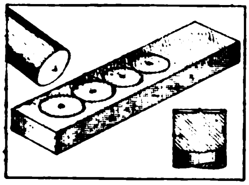
When a pattern maker wishes to do a quick job of turning up either one or both halves of a split pattern, he often makes use of small "pinch dogs," which are driven into the pieces to hold them together. These dogs are not always very satisfactory, and are dangerous, as they may fly out at high speed. One pattern maker uses circular dogs of the type illustrated on both live and dead centers of the lathe. One of the dogs is driven into each end of the wood; the one at the dead-center end revolves on the dead center, while the other revolves with the live center. The flange around the dog aids in withdrawing it after the work is completed. It is well to caseharden the sharp edge.



To Dry a Lens Properly

Surveyors often find their instrument lenses fogged in cold weather, due to moisture condensing upon the cold crystals. It should not be wiped off, as this in time injures the polished surfaces, but should be evaporated by gently warming the lens. Especially is this necessary when the inner surfaces become fogged; they will soon clear if the instrument is set in a warm room. This is seldom practicable, however, but if the objective end of the tube is grasped in the bare hand, in a few minutes the lenses will be dry and clear. Never put any lens near a stove to dry, as even a moderate temperature may injure the cemented joint and ruin the lens.

Punch for Laying Out Drill Holes



When laying out a row of holes for cutting out a piece of metal, as in die work, it often requires a great deal of practice to be able to space the holes accurately. A special punch which makes this work much easier can be made from a piece of drill rod the size of the drill to be used. Shape the end, as shown in the illustration; then harden and temper the piece for use as a punch. The manner of using it is evident from the illustration; the small center marks can be deepened with an ordinary center punch before drilling, if found convenient.—J. H. Beebee, Rochester, N. Y.

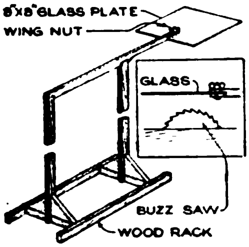
THE THOUSANDTH OF AN INCH

By Thos. A. McMahon

At night I sit and ponder
  On the thousandth of an inch;
I knit my brow, and scratch my head,
  And then my fists I clinch.
O show to me the man, sez I—
  If Irish, Dutch, or Frinch—
The man who first invented
  The thousandth of an inch!

When finally I crawl in bed,
  So thankful for a snooze,
I drive my sorrows all away
  Without the aid of booze—
I dream that they have caught the man,
  And him they now will lynch,
By jinks! The man who did invent
  The thousandth of an inch!

Glass Plate over Buzz Saw Protects Eyes

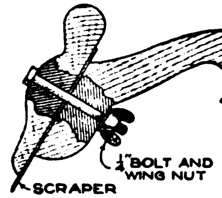


When a buzz saw begins to get dull, it usually throws sawdust quite badly into the face of the operator. One user of a buzz saw found it convenient to have handy a pane of glass mounted on a frame, as illustrated, so that the glass could be placed directly over the saw, to shield the operator's face. The utmost care must, of course, be taken to make the frame solid and steady, so as to prevent the glass from coming into contact with the saw.—Frederic Doremus, Passaic, N. J.

Homemade Concrete Tombstone

The photograph shows the splendid results obtained in making a tombstone of concrete with no special equipment. A mold was made out of ⅞-in. lumber, in four parts, for the four sections of the tombstone. The letters were cut from cardboard, and fastened to the side of the mold, reading in reverse so that they would be in the correct order on the stone. The concrete was mixed, using one part cement and three of sand, and was poured in from the top. It takes about three weeks for such a stone to dry, but if well made, it is scarcely less durable than a marble stone, and makes an appearance which is not at all unpleasing.—James F. Welliner, Danville, Pa.

A Handle for Scraper Blades

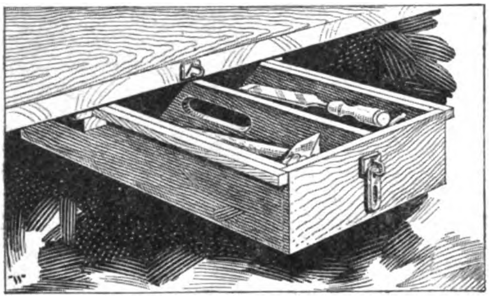


Scrapers for wood are widely used without handles, the blade being held directly in the hands. While this is hard on the fingers, especially of an inexperienced man, it is necessary, chiefly in order to get into corners where a handle would be in the way, or would interfere with holding the scraper at the proper angle. A carpenter, who uses on his scrapers the handle here illustrated, finds that it gives very little trouble in this respect, and saves soreness of the fingers when there is much of this kind of work to do. The handle is cut from hard wood, ⅞ in. thick, and the backing block is rounded off smooth at the top to allow a firm hold by the left hand, giving plenty of pressure against the work.—Benj. W. Bush, Keyport, N. J.

¶All bearing surfaces in machinery should be as large as is practicable, insuring against undue wear. Compensation for wear should also be provided for.

A Portable Tool Drawer

A carpenter who works in a plant where he has to carry his tools around frequently to various locations in the shop, fitted up a box which serves either as a drawer for his workbench or for a tray to be carried. When in its place under the bench, the drawer is readily locked with a padlock over the hasp shown. When the carpenter starts out to work in another part of the plant, he merely takes out the drawer, catches it by the handle in the middle partition and carries it with him.—Chas. H. Willey, Concord, N. H.



Transfer of Tools from the Drawer to a Portable Tray is Avoided by Combining the Two Receptacles into One, Which Serves the Purpose of Both

Proper Placing of Three Hinges on a Door

When three hinges are used on a barn or garage door, they are usually placed equidistant; the third hinge, being midway between the other two, is then of little use except in restraining any tendency of the door to warp. It does very little good toward supporting the weight of the door, and on doors where warping is not to be feared, it will make a better job if the third hinge is placed directly underneath the upper hinge, as this is where its strength will count the most. The appearance may not be quite so symmetrical, but the door will work longer without attention.

Lead "German Soldiers" Used as Targets

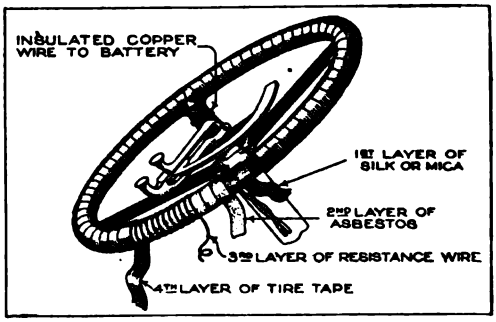
The enterprising owner of a public shooting gallery set up for targets, instead of the ordinary figures of birds or fowl, a line of small German soldiers made of lead. Every successful shot broke up one of these soldiers, but the pieces of lead were caught up in a net and were readily recast.—Philip A. Wall, Bedford, Mass.

Saving Fuel on the Gas Range

A kink which will save gas in the kitchen is the use of a large piece of sheet iron, to be placed directly on top of the stove when there are several utensils to be kept warm. The sheet-iron plate conducts the heat from one burner and distributes it to the others so that only the one burner need be kept lighted. The sheet-iron slide which many stoves have under the burners to catch dirt, if easily removed, will be quite satisfactory for this purpose. No great amount of heat will be conducted to the vessels indirectly over the fire, but there will be sufficient to keep the contents warm enough for eating.—G. A. Luers, Washington, D. C.

Electric Hand Warmer for Automobile Steering Wheel

One of the simplest electrical conveniences to make for the automobile is an electric hand warmer. On the half of the steering wheel that comes toward the driver's body, or where he will grasp the wheel, wind a layer of heavy silk cloth. Mica will do just as well, and if one is sure the wheel will never become wet, no silk layer is necessary. Next, cut some asbestos in strips, and wind it over the silk. Then wind some resistance wire carefully upon the asbestos, with each turn 1/4 in. from the next, being careful that no two turns touch. Over this wind tire tape, extending it also over the other half of the wheel, for the sake of uniform appearance. To the ends of the resistance wire connect insulated, stranded copper wires, that reach down the steering post to a connection with the storage battery of the car. Place a switch in the line so that the circuit can be broken. A good enough resistance material for this purpose is bare iron wire. For six-volt bat-

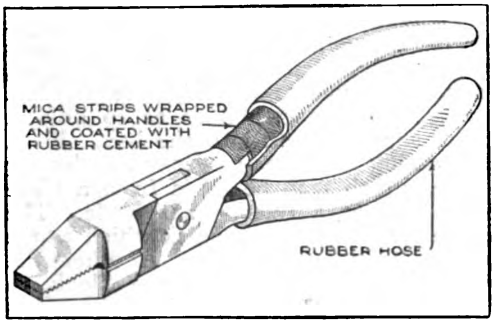

INSULATED COPPER WIRE TO BATTERY
1ST LAYER OF SILK OR MICA
2ND LAYER OF ASBESTOS
3RD LAYER OF RESISTANCE WIRE
4TH LAYER OF TIRE TAPE

A Little Electric Current from the Storage Battery on the Car, Passing through Resistance Wire Wound on the Steering Wheel, Keeps the Driver's Hands Warm on the Coldest Days

teries, 30 ft. of No. 20 gauge iron wire will do; for 12 volts, about No. 23 should be used. The wire should become only moderately hot; this can be determined in each particular case before the tire tape is permanently wound in place.—F. E. Brimmer, Dalton, N. Y.

Insulating Handles for Pliers and Other Tools

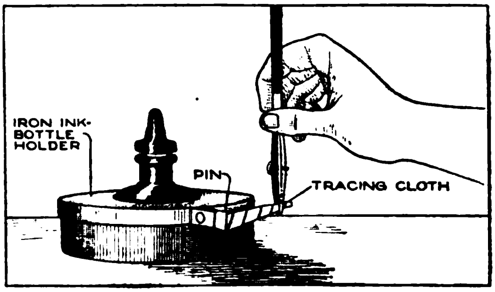
In order that the electrician may work with safety on wires carrying high voltage, the handles of his pliers, and other tools, are often insulated with tape or wood. These materials do not form a satisfactory insulation against any considerable voltage, except when dry and in good condition. Those who wish a better quality of insulation may use this method: Give the handle a coat of shellac, and wind around it strips of mica; over this give a coat of rubber cement, such as is used for repairing automobile tires. Before the cement gets too hard, slip over it a piece of red-rubber tubing (not fabric hose) with walls about ⅛ in. thick. When the cement has hardened, it will hold the rubber tubing firmly in place. One reason for selecting red-rubber tubing rather than white is that it makes the tool much easier to distinguish on a bench, which may be full of other tools and white-porcelain articles. The outer ends of the pieces of rubber tubing should be vulcanized together, or stitched with stout thread, in order to protect the hands.


MICA STRIPS WRAPPED AROUND HANDLES AND COATED WITH RUBBER CEMENT
RUBBER HOSE

Rubber Tubing Cemented on the Handles of the Pliers, with a Layer of Mica Between, Gives a Real Insulating Handle

Pen Wiper for Draftsmen

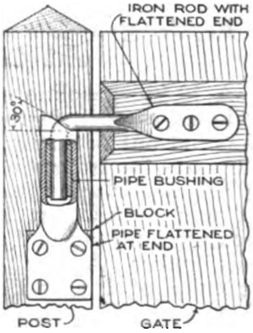
Much time can be saved in the drafting room by providing means for wiping out the pen with one hand, while lifting the cork from the ink bottle with the other. Filling the pen is an operation which must be performed so often that this slight saving is of considerable value. A convenient arrangement for this purpose consists of a band of sheet brass around the bottle holder, fastened with a small screw. The projecting end is wrapped with absorbent linen, such as may be produced by washing out scraps of tracing cloth in hot water. A pin is clamped in near the screw, so that the end of the strip of linen will catch on its point and be prevented from unraveling. The pen is wiped with a movement of one hand, as illustrated, the weight of the bottle holder preventing its being lifted off the table.—Q. J. Workman, Cleveland, Ohio.



Much of the Tracer's Time can be Saved if He can Clean Out and Fill His Ruling Pen with One Hand, Leaving the Other Free to Uncover the Ink Bottle

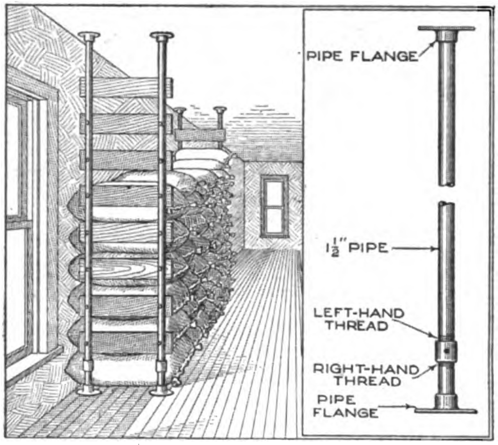
Springless Self-Closing Gate Hinge

A very simple hinge for the farm gate, which possesses great strength and durability, consists of two pieces of pipe and a piece of round bar bent to a right angle. The short piece of pipe should be driven into the larger piece, the lower end of which is flattened and fastened with screws to the post. The upper end of this piece of pipe should be beveled off at an angle of about 30°, so that, as the gate is opened, it will be lifted slightly and its weight will tend to close it without the use of any spring. It is not always necessary to have the two pieces of pipe, but it makes a much stronger and more durable hinge, as the rod does not need to be bent at such a sharp angle, and the larger pipe will cause less strain on the screws which hold the flattened pipe in place.



Movable Posts Made of Pipe Useful in Stock Rooms

The sacks in the picture are held between movable posts, each made of two pieces of pipe, two flanges, and a coupling. At the coupling, both pieces of pipe are threaded with a straight thread, not a pipe thread, one being right-hand and the other left-hand. The coupling is threaded internally, to correspond with these, and is adjusted like a turnbuckle, a hole being drilled through the center of it, to take an iron rod, as a wrench. To move the posts from one place to another, it is only necessary to loosen this coupling, move the posts, and again tighten it up.



Movable Steel Posts, between Which Stock can be Piled Up, will be Found Useful in Many Factory Stock Rooms

Repairing a Cracked Water Jacket with Cement

A 10-hp. gasoline engine suddenly developed a crack in the water jacket, and was put out of commission. As the location was far from a repair shop, an emergency repair was attempted with cement. It was found that by having a rough boxing built around the cylinder and a few inches above it, and pouring in a mixture of 1 part Portland cement and 3 parts sand, with a few iron bars laid across it to prevent cracking, the crack was plugged so that no water leaked. After the cement had dried, the engine ran as well as ever.—H. S. Rich, Cromwell, Conn.

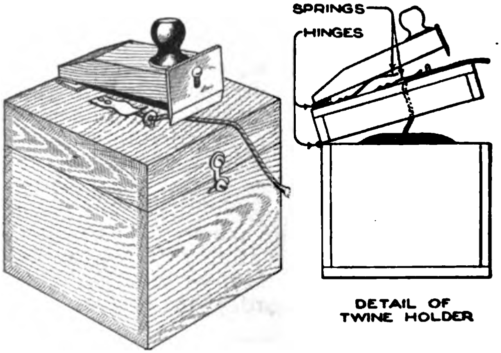
ℭWhere rubber gaskets might be objectionable, as on cooking utensils, tin foil is very useful for the purpose.

Lighting a Fire at the Top Saves Fuel

Although a coal fire always burns better, especially at the start, when lighted from the bottom, it has been found to be much more enonomical of coal if the paper and kindling wood are placed above the coal. A few small coals and cinders are spread over the top of the kindling wood to enable a coal fire to be started. After the top layer begins to burn properly, the fire will spread slowly downward, if the air draft is right. This method secures the most complete combustion, because the gases from the unburned coal at the bottom must pass through the burning layer at the top, and thus become completely burned. It is admittedly harder to build and control this kind of a fire, but the saving in fuel often justifies the extra trouble.

Handy Twine Holder and Cutter

To make a very convenient holder and cutter for twine, place the ball of twine in a wooden box, with the end coming out through a hole in the lid, over which a flat spring is fastened so as to hold it from slipping back into the box. From this spring the twine comes out under the knife, which may be made from a piece of a saw or a safety-razor blade. The knife is mounted on a block which works on a hinge, as shown. Another flat spring is mounted under the block, to keep it away from the twine while it is being drawn out. To cut off the twine, simply strike the knob on top with the hand, bringing the knife down on the twine. The knife should be removed and sharpened when necessary.—Chandler H. Montgomery, Piqua, Ohio.



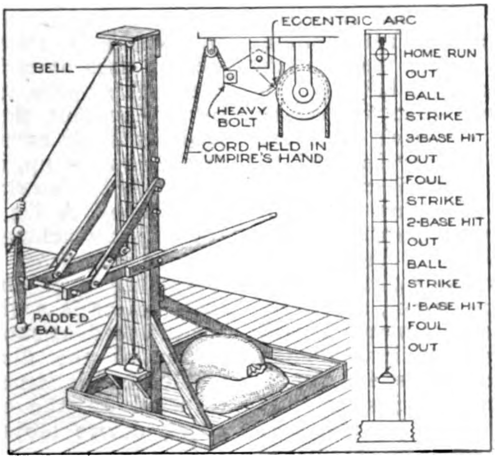
A Great Convenience in Tying Up Packages Is a Twine Cutter, Which Never Gets Lost and can be Operated by Striking the Hand against a Knob

A Baseball Batting Machine

By A. D. GOODRICH

WHEN winter snows and spring rains keep the baseball fan indoors, his interest in the game by no means dies out. If he has a gymnasium large enough for a good game of indoor baseball, he may find in this way consolation for the impossible condition of the diamond. For those who have no access to such a gymnasium, a great deal of fun can be obtained from a batting machine, with which a complete imitation game of baseball can be played by any number of boys. The materials can usually be found in a wood pile or about the house, or can be obtained at the cost of only a few cents.

The upright, or score board, of the machine should be of good clear lumber ⅞ in. thick, 4 to 6 in. wide, and 12 or 14 ft. long. It should be supported on a base and firmly braced to take the shock from the bat. If this base is boarded over on the bottom, it will be much stiffened and then can be weighted down with sandbags, or any other heavy object which can be thrown onto the floor of the base. The upright should be strengthened by two rails of the same length, nailed to its sides. It is not absolutely necessary that these reach the whole length of the upright, but if they do, the job will look much neater. At the top a block of wood projects out a few inches in front of the score board, being set with the grain at right angles to the face of the score board, so as to avoid splitting. To this block is attached a pulley. This completes the stationary part of the machine.



Playing Baseball in the Barn or in a Small Back Yard is Made Entirely Possible with this Machine, Which Imitates Closely the Actual Game. The Players Score Hits and Runs as in an Actual Game of Baseball

The ball which is struck with the bat may be an old croquet ball, cut down, if desired, and covered with some form of padding to a depth of ¼ or ½ in. It is mounted on one end of a piece of ⅞-in. wood, 3½ in. wide at the center, and tapering down to 1 in. at the ends. At the other end of this arm is mounted another wooden ball which serves merely to counterbalance the weight of the batted ball, and therefore need not be padded. The two balls should be painted different colors, so that one may be sure at all times that he is striking the padded ball and not the counterbalancing one. Holes, about ⅞ in. in diameter, are bored in the balls and they are set on the ends of the tapered piece, which are rounded off with a knife or chisel to fit the holes. Nails are driven through to hold them on, and a long nail also serves to hold the taper piece or striking arm tightly on the shaft. This shaft may be made of ⅜ or ½-in. round iron, if convenient; otherwise, a piece of broomstick will serve. If the diameter of the shaft is less than 1 in. or 2 in., depending on the size of the cord and the weight used, it should be enlarged by winding hard paper around it, in order to get the necessary diameter for winding up the cord. This cord should be strong but very flexible, so as to run freely over the pulleys; a good quality of fishline will do very well, but if this is not at hand, common hemp twine will give good results. The line should be tied around the shaft and tacked at the proper side of it, so that the striking arm will rest with the padded ball downward.

The bracket in which the shaft is mounted is made to swing on the bolts by which it is fastened to the upright rails beside the score board. The horizontal pieces of the bracket are 22 in. long and 4 in. high, and are bolted to the upright rails at a distance of 42 in. from the ground. A long lever extends back from one of these horizontals, by which the position of the ball can be shifted up and down. The two hooks which fit over pins on the upright rails are for use when it is desired to hold the ball in a stationary position.

The cord passes around the two pulleys shown, down to a weight, which may be a piece of pipe or other scrap of metal of the proper weight, which can best be determined by experiment. Near the top of the score board, at the mark representing "home run," a bell may be located, so that the powerful batsman who knocks a "home run" is notified of the fact by a tap on the bell. An old doorbell, bicycle bell, or a bell from an alarm clock, can readily be rigged up to ring as the weight reaches the proper height. To avoid breaking the cord when the weight falls to the bottom of its travel after the ball has been struck, it may be well to build a platform, on which it will come to rest at the same time that the cord becomes entirely unwound from the shaft.

In marking the different points on the score board, the suggestions given on the sketch may be followed or not, according to the preference of the players. It will be seen that the success which a batsman has in making progress toward a run is largely a matter of chance, just as it is in a real game. He may, for instance, hit the ball hard enough so that in the real game it would represent a three-base hit, unless it was caught by one of the opposing team. This is represented on the machine by having a mark to represent "out" at various intervals along the scale, as all that the batsman can do either in the game or on the machine is to strike the ball as hard and straight as he can, and trust to the inability of the fielders to get under it, in the case of the actual game, or to the chance of the weight rising to one of the lucky marks rather than the unlucky ones, in the case of the machine. While the imitation is not so perfect in the case of fouls and "balls," the game as played on the machine will be found sufficiently interesting.

To start the game, any number of players may choose sides, and toss up for the choice of "ins" or "outs." Each side then chooses one or more "pitchers." The "pitcher" of the "out" team takes his place at the long handle, while the members of the "in" team take their turn at the bat. They are called in the proper batting order, until three of them have been retired, as in the actual game. It is well to have certain places near the machine designated as bases; as a player scores a "single," he then takes his place on first base. If the next man scores a two-base hit, the first moves to third base, and so on. The pitchers should manipulate the lever so that the ball rises and falls slightly as is the case with a pitched ball. The reason for having the lever quite long is to prevent the ball being moved too quickly to represent the pitched balls which the batsman should have to contend with. If the pitcher really tries, he can imitate closely various types of pitching, and this will add greatly to the interest of the game.

It will be the duty of the umpire to watch closely the height to which the weight rises at each stroke, and call off the strikes, balls, etc. If there is nothing to prevent the weight from falling back as soon as the energy of the bat stroke is used up, it will take careful observation to determine the mark reached each time. A little device built on the top of the machine will remedy this, and remove most of the opportunity for wrangling over the umpire's decisions. This device is a check or friction clamp for the cord, as shown in the detail at the center of the illustration. When the padded ball is struck and the cord begins to wind up, the eccentric block of the check device loosens and lets the cord pass through with but little friction. When the cord has reached the limit of its travel and begins to unwind, the eccentric surface of the block, forced against the cord by the pull of a small weight at the left end of it, clamps the cord tightly, and prevents it from falling until the umpire has had plenty of time to "see the play." He then pulls the string, which passes through a screw eye to the eccentric block, releasing the main cord, and restoring the ball for the next stroke of the bat.

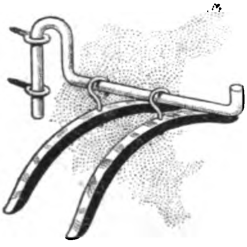
¶Paint is readily cleaned with a damp rag dipped in the best quality of whiting. A little rubbing will remove dirt and grease.

Tinting Photos without Special Coloring Matter

Seashore scenes, sunsets, etc., show up well in a photograph which is tinted to an even pink. Yellow gives a pleasing effect for some prints, as do also purple and red. The latter is especially appropriate for fireside interior scenes. To obtain these tints, expose gaslight paper in the usual way, develop and wash off the developer completely, then dry the prints in the dark room without fixing. When they are dry, expose them to the sun's rays until a tint is obtained considerably deeper than that which is wanted. Then fix the print in the usual way. Such prints are as permanent as those made in the ordinary way.

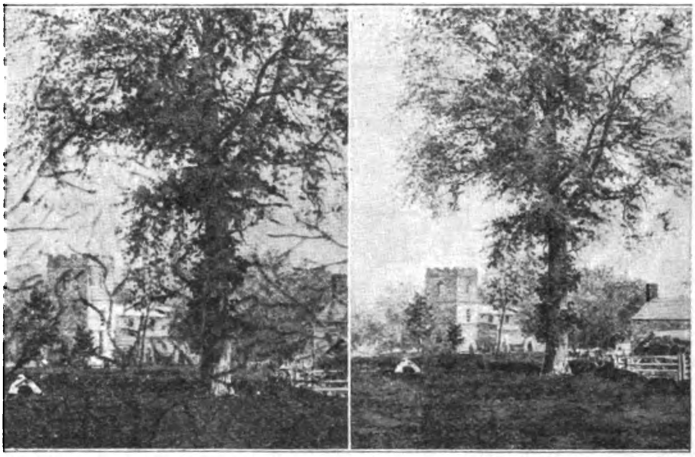
Another method is to use gaslight paper and print in the sun. Expose until the whole image is a dark purple. Immerse it in an ordinary fixing bath, which will at once tone and fix it. The color of prints made in this way is yellow, orange, pink, red, or purple, according to how long the print was exposed to the sun. In both these methods, good results can only be obtained after some experimenting.—Fred C. Davis, St. Joseph, Mo.

Swinging Clothes-Hanger Rod for Crowded Closet



The bracket illustrated enables clothes, which are hung in a dark closet, to be swung out where they can be examined in the light. A piece of brass rod is bent to the shape shown, and is hung in two stout screw eyes. On this rod the clothes hangers are hung. The size of the materials used will depend upon the weight of the clothes to be accommodated. For heavy suits or overcoats it may be advisable to use heavy U-bolts with a piece of iron pipe forming the swinging bracket.—Mrs. Grace E. Willey, Concord, N. H.

Renewing Old Paintings with Alcohol



A Painting with Numerous Cracks was Exposed to Alcohol Fumes, and the Photograph at the Right Shows the Wonderful Change Made

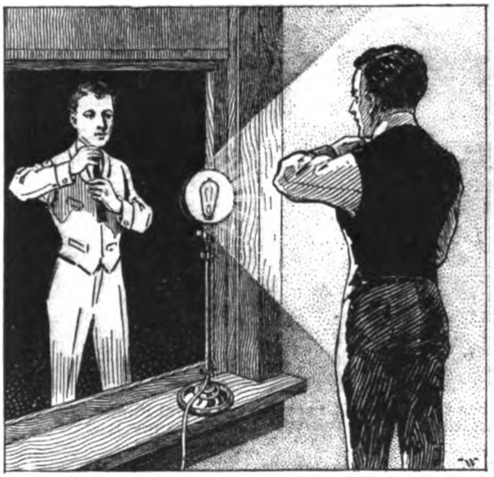
The photographs show an oil painting before and after the application of the following method of removing cracks and blemishes in it: Fill a shallow dish with alcohol, and place the picture downward over it, taking care that it does not actually touch the liquid. The fumes from the alcohol rise to the paint, and in a few minutes the cracks fill up and the colors appear bright and new. It is necessary to watch the process closely, for if the painting is exposed to the fumes too long, the colors will run together and the picture will be spoiled. With reasonable care, this should never happen, and old paintings, which would otherwise have to be thrown away, can be made as good as new.—S. Leonard Bastin, Bournemouth, England.

Linoleum Stamps

Handy stamps to supplement, or take the place of rubber stamps, can easily be made from ordinary linoleum. First, draw the design on paper, under which has been placed a piece of carbon paper, coated side up. After the design has been finished, it will appear on the reverse side of the paper as it should on the stamp. Then transfer the design to the linoleum with carbon paper, or paste the paper itself on the linoleum. With a knife cut away the surface of the linoleum to the depth of about 1/16 in., everywhere except where the impression is to be made. Cut out the portion of the linoleum containing the stamp from the remainder of the piece selected, mount it with glue on a small block of wood, and the stamp is completed.—D. G. Humm, Torrance, Calif.

The Window as a Mirror

Everyone has noticed that under certain conditions he can see his image with tolerable distinctness in a window pane. By proper arrangement of the electric light in a dark room, the image can be made quite plain, enabling one to use the window as a mirror. The illustration shows the proper position of the light for the purpose. The effect will be best when there is no light entering the window from the outside.—M. Tomasulo, Easton, Pennsylvania.


When the Light is Properly Directed So as to Make the Image Distinct, a Window Makes a Very Satisfactory Mirror

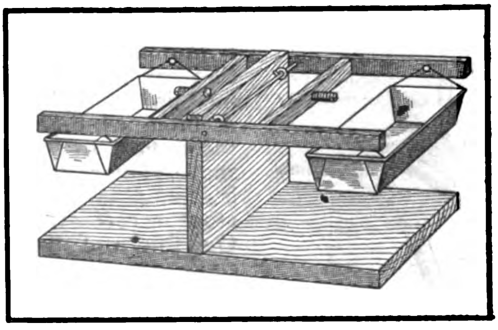
Protecting Checks with a Typewriter

For those who occasionally write a check, but whose bank account does not warrant the purchase of a check-protecting machine, it may be interesting to know that a check may be written on a standard typewriter which will put considerable obstacles in the way of anyone who might try to raise the amount for which it is written. This is done by rolling up on the typewriter platen an ordinary thick blotter, so that two or three thicknesses act as a cushion for the type; the check is then inserted and is written with a heavy touch on the typewriter. Unless the type is worn very smooth, the letters can be pressed into the paper so that an effect similar to embossing is obtained. This would, of course, not be a formidable obstacle to a professional check raiser, but a somewhat more effective one is found in punching holes directly in front of and after the amount of the check, by means of the hyphen or period. On most typewriters, these characters will so tear the paper that it would be next to impossible to conceal effectively any tampering with the check.

Homemade Scales

Toy scales of this type can be made from berry boxes, butter trays, or pasteboard cartons, but more substantial, practical scales should have pans made of bread tins, or stout flat boxes of wood, or other durable material. For removable scoops, four pans can be used instead of two, or a frame of wood or iron may be made to fit and hold the pans. The beams are two uniform, straight strips of wood, fastened together with two braces, which are somewhat longer than the pans, uniform and equidistant from the center so as to balance well. Two rather heavy bolts or screws, run through holes in the crosspieces, take up little inequalities in weight, and enable one to adjust the scales to an exact balance.

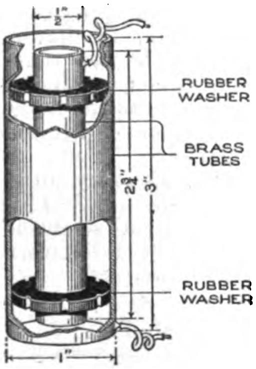
The base is a board somewhat longer than the beams, and carries an upright support, or fulcrum, high enough to keep the pans from touching when in balance, even when the load is on one side of the pan, tilting it out of level. A stout cord, or wire, from both corners of the pan, on each end, runs over a tack near the end of each of the two beams. A supporting strand of wire connects the centers of the two beams. Screw eyes in the upright, as far apart as convenient, hold the wire support. It is important to remember that the holes for the wire in the middle of the beam must not be lower than the tacks at the end, or the


Made Chiefly of a Few Sticks, This Scale Is of Much Practical Usefulness, Besides Being an Instructive Toy

scales will never come to rest in a horizontal position. Also, the greatest care must be used to get the end tacks equidistant from the center holes, or the scales, even though they can be made to balance, will not weigh correctly. For greater sensitiveness, a triangular strip of wood or metal, sharp edge down, can be substituted for the string or wire support in the center, thus making the support somewhat firmer and the balance more delicate. For weights, bags of sand will serve, or tin boxes filled with sand or other heavy material, carefully weighed from accurate standards.—Frank M. Rich, Paterson, N. J.

Electric Water Heater Uses Water as Resistor

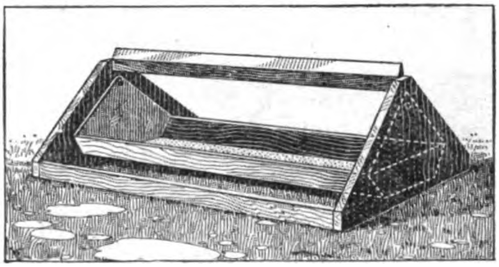
Probably the simplest form of electric heater for use in heating small quantities of water consists of two conducting surfaces placed at a fixed distance from each other in the water, the current then flowing directly through the water from one plate to the other. The water is heated by its own resistance to the passage of the current. This method will not work with distilled water, as practically no current will flow through pure water; ordinary drinking water, however, contains enough mineral matter in solution to permit the use of this principle in a heater. A convenient form consists of two brass tubes, one inside of the other, separated by two rubber washers, which have notches or holes made in them, to permit the water to circulate freely between them. One wire is soldered to one end of the inner tube and the other wire to the opposite end of the outer tube.



The heater of dimensions given in the illustration will not take more than a few amperes at 110 volts in ordinary water. It should not, of course, be used with sea water or other water containing much mineral matter, except on a much lower voltage. In any case, care should be taken that the circuit is properly protected by a fuse before inserting the heater in the vessel of water.—D. J. McKean, Alameda, Calif.

Feeding Tray for Chickens Enforces Cleanliness

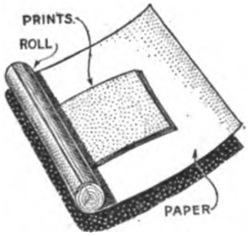
The illustration shows a feeding tray for use in feeding corn or other fattening foods to chickens. It is often troublesome to induce the fowls to keep this kind of food reasonably clean, as they like to step into it and scratch, wasting and soiling the food. By placing the grain in a tray, which hangs from two nails above and swings freely upon them, the hens are prevented from jumping into the tray, as the movement due to their weight will frighten them so that they will prefer to stay outside. With the addition of a sharp edge on the upper brace, the tray almost entirely prevents the soiling of food by the chickens.—William Schlawitz, Arlington, N. J.



The Tray Keeps the Chicken Feed Clean. Hens Which Jump into It are Quickly Frightened by Its Movement and Soon Learn to Feed without Venturing beyond the Outer Rail

Straightening Out Photographic Prints Which have Curled Up

The amateur photographer who finishes his own work is often puzzled as to how to make his prints lie flat. By using the following simple device, prints can be straightened in batches in a few moments, and will retain their shape.



Glue a piece of heavy wrapping paper to a wooden cylinder, or a mailing tube, so the paper will extend about 2 ft. Then, when the prints are dry, lay a batch of them, face down, on the inside of the paper, roll them up tightly, and slip on an elastic band to hold them in place. Set away for about five minutes, and when unrolled, the prints will be perfectly flat.—L. B. Robbins, Daytona, Florida.

Making Ice from Snow

A farmer has tried, with considerable success, the method of making ice in winter by compressing snow into blocks and storing it like ordinary ice. A wooden box or frame is made without top or bottom, but with a handle at each end, by which it is lifted. When plenty of snow is on the ground, damp enough to stick together, a large pile of it is collected by means of a horse-drawn drag. The snow is then shoveled into the frame, or mold, and packed down tightly. If the snow is not wet enough to pack well, a little water can be thrown into it, but no more water should be added than is necessary to produce a compact, heavy cake. The frame is then removed by its handles; the snow block is taken away to be stored, and the mold is ready to be filled again. It is found that while the blocks are in storage, the snow consolidates. The two chief advantages are that the blocks are in more convenient shape, being as thick as desired, and that they are much cheaper to obtain.—John B. Smyth, Pittsburgh, Pa.

Damp Snow, Compressed into Blocks and Stored, Is Nearly as Lasting as Natural Ice

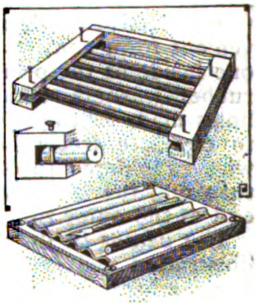
Mop Made from Package Strings

A collection of strings taken from packages, instead of being thrown away, can be made into a mop. Cut the strings to a length of about 3 ft. each, and hang them over a horizontal wire so that the ends are about even. When a sufficient number is thus collected, wind the wire, with strings hanging from it, around the end of a piece of broomstick, fitting the wire into a groove cut around the broomstick for the purpose. Wrap with heavy cord or smaller wire, and the mop is ready for use. A mop so made has been in service for over three years.

Shaking Down a Fever Thermometer

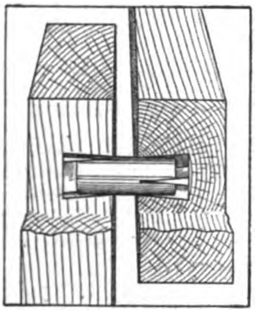
Many people have difficulty in shaking down fever thermometers. Best results are often secured by not shaking the thermometer at all, but holding the upper end of the thermometer in the fingers and swinging the arm around repeatedly. If this is not found convenient or effective, or if one wishes to avoid the danger of swinging the thermometer against some object and breaking it, place it in its case and tie a string to the case, so that it hangs from the string with the thermometer right side up. Then catch the string a foot or two from the thermometer case and whirl the instrument around rapidly. The centrifugal force brings the mercury column down with very little effort on the part of the operator. This method is used effectively in scientific instruments, and should be better known among users of fever thermometers.

Handy Pen-and-Brush Tray Made of Blotting Paper



A very handy article on the desk or drawing table is a pen-and-brush tray made of blotting paper, formed into grooves or corrugations just the right size to take a pencil or penholder. The blotting paper, after being formed to the proper shape, must be held in shape while being glued to the pasteboard, and until the glue hardens sufficiently to hold it. If one wishes to make a number of such trays, a frame, such as shown in the sketch, will make the work of forming the blotting paper very easy. A number of round sticks, about the size of the penholders or brushes, are obtained; lead pencils may be used, especially if they are of an extra-large diameter. They are mounted in the frame, which may be made of wood or pasteboard, so that they slide freely up and down. The blotting paper, preferably of two or three thicknesses, is threaded in and out over the round sticks or lead pencils, and when it is all in place, two small nails over the ends of the bars or lead pencils will hold the blotting paper tight. While still in this frame, glue may be laid in narrow lines between the lead pencils on one side, and the pasteboard may be pressed on and the glue permitted to harden. The alternate lead pencils, confined under the blotting paper, are then pushed out at the end, and the pen container is ready for use. It may be trimmed off, mounted with thumb tacks on a wooden block, and painted or ornamented to suit the maker's taste.

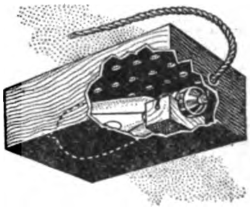
Invisible Joint Holds Wood Firmly without Glue



It is possible, by the method shown, to fasten together securely two pieces of wood, 1½ in. thick or more, so as to leave absolutely no external mark to show the nature of the fastening. The dowel pin is slotted and provided with two wedges, whose length must be carefully determined by experience in making such joints, as it depends largely on the kind of wood and tightness of the fit. For a firm joint, each hole should be recessed out with a gouge, so as to be larger at the bottom than the pin, and make room for a wedge of appreciable thickness.

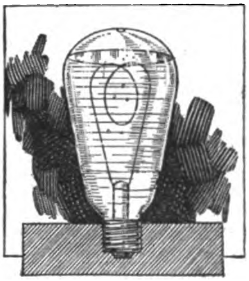
To prevent turning, two or more such pins may be inserted side by side. The chief problem in such cases is to line the several holes exactly with those opposite; this may be done quite accurately by fitting into the finished holes in one of the pieces to be joined, short pieces of iron rod with sharp edges, so that they all stand out a short distance above the surface. The other piece of wood is then laid in place and struck a blow with the mallet, thus marking exactly the position of the holes to be bored in it.—Chas. A. Black, Jr., Hightstown, N. J.

Electric Foot Warmer is Cheap Luxury



Nothing is more comfortable when coming into the house on a cold night than an electric foot warmer. A very cheap and efficient form consists of a wooden box, about 10 in. square and 6 in. high. The cover of the box should preferably be of metal, with holes drilled to facilitate the passage of heat in an upward direction. There should also be one or two holes in the lower part of the box for entry of air. The heating unit is an ordinary carbon-filament electric lamp, which can be mounted in a keyless socket with a cord leading out through the end of the box to an attachment plug. If it is preferred to have a top surface which does not heat up so rapidly, but eliminates the possibility of getting too hot for comfort, a wooden top may be used, but it should be lined with asbestos. Either the top or bottom should be attached with screws, so as to be removable for renewing the lamp. If the lamp comes close to any of the wooden surfaces, an asbestos lining is advisable, as a lamp inclosed this way may become very hot. A 16-cp. carbon lamp will furnish more than enough heat.

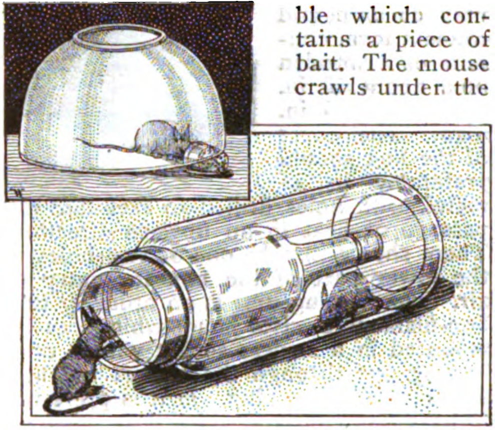
Electric Lamp as an Oil Container



An incandescent lamp which had a broken filament was used as a can to hold kerosene for an oil stone. It was filled in this way: The large end was inserted in a vessel of kerosene, and the tip knocked off with a file or knife. The vacuum inside the globe caused the oil to rush in until the globe was nearly full. To throw oil on the stone, the globe is inverted and a few drops are shaken out from the hole where the tip was. The lamp can be kept very handy in a hole drilled in the bench, or in a block large enough to take its threaded base.—Gus H. Klinck, Jr., Summerville, S. C.

Mouse Traps Made from Familiar Household Objects

Two ways of capturing mice are shown in the illustration. In the small picture, a glass tumbler or bowl is inverted and rests on a thimble which contains a piece of bait. The mouse crawls under the rim of the bowl, drawn by the smell of the bait, and in endeavoring to extract it from the thimble, is sure to shake off the bowl, in which the mouse then finds itself imprisoned.



By the Use of Familiar Glass Objects, Mice are Caught Alive without Injury, and may be Killed in Any Way Preferred

In the large picture, two glass bottles are used, the larger one having a wide mouth, somewhat larger in diameter than the body of the smaller bottle. The small bottle should have a neck about ¾ in. in diameter, and its bottom should be cut off, by means of a hot iron wire stretched around it, or by some other method. It is fitted into the larger bottle, with a strip of felt, or other packing, to fill the space between it and the mouth of the larger bottle. Its neck should extend to within 1 or 1½ in. of the bottom of the larger bottle. The bait is placed in the larger bottle, where it is in full view of the mice. They will ultimately find their way to it, through the neck of the inner bottle, but will have much greater difficulty in making their way out again, if the neck of the bottle is placed the proper distance from the bottom.

After the mouse caught in the trap is examined, it can be killed by pouring in water. In the case of the bowl trap, slide under the bowl a piece of pasteboard with a hole too small for the mouse to escape through; then turn the bowl right side up, keeping the pasteboard over it, and pour in water through the hole, setting a weight on top of the pasteboard. The bottle trap need only be set on end, and water poured in through the open end of the inner bottle.

Using a Three-Cornered File as a Glass Cutter

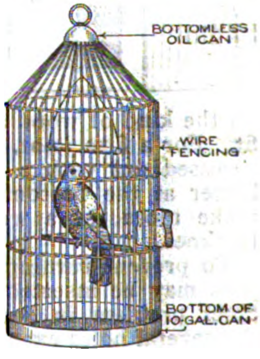
When no glass cutter is at hand, and a piece of window glass must be cut, use a three-cornered file. Break off the tip, so as to get sharp points of contact, and scratch the glass in the same manner as with an ordinary glass cutter. A little more pressure and care are required, but good results can be obtained.—R. J. Stephens, Kansas City, Mo.

Use Envelopes Over Again

A good way to save money spent in buying envelopes is to save all the envelopes received by third-class mail, until a number have accumulated, and, after soaking them in water for a few minutes to soften the mucilage, turn them inside out, and stick them together again. They are then as good as new blank envelopes, and with the present high price of paper, this method will save a good many pennies.—Victor H. Todd, Orange, New Jersey.

Bird Cages Made from Wire Fencing

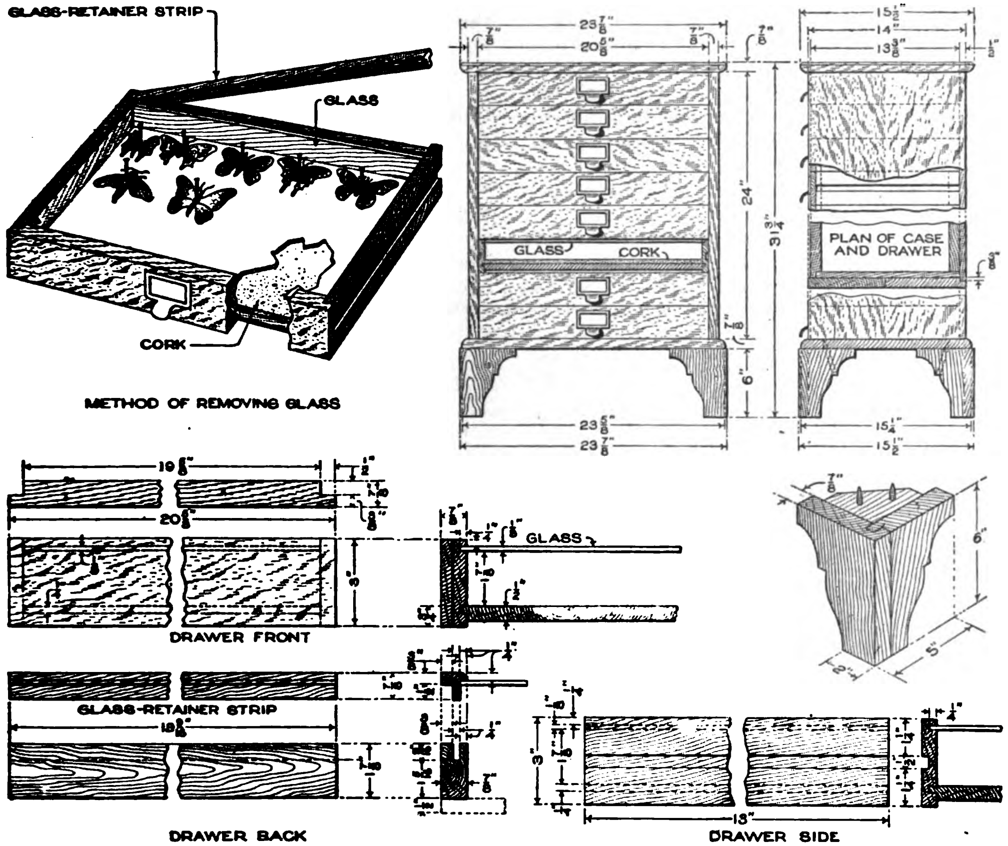
A large cage for a parrot can readily be made of wire fencing. The bottom of the cage is made from a galvanized-iron pan, or from the bottom of an old gasoline can, and at the top of the cage the wires are bent over, forming a conical top. The ends of the wires are fitted into a piece of sheet iron bent to the shape of a cone, or better, to an old lubricating-oil can which has the stem and bottom removed. An iron ring through the top serves to hang up the cage, and any other fittings desired can be mounted. The bottom of the cage may easily be made removable and may take the place of a door, or a hole can be cut in the fencing, and a door of sheet iron, or woven wire, fitted.—Chas. A. Black, Jr., Hightstown, N. J.



A Collector's Cabinet

By CHARLES A. KING

A MOST useful object to the collector of insects, coins, minerals, or small specimens of any sort, is a conveniently arranged case or container, which will be dust and moth-proof, and permit the collection to be examined without handling the specimens. The cabinet here described was built and used for a collection of insects, but it is suitable without any change of dimensions for various other purposes, and it is not difficult to make the drawers a different height, if required for the purpose in view.



A Cabinet for Preserving Specimens: Each Drawer Has a Cork Bottom to Which the Insects or Other Specimens may be Fastened, and a Glass Top Which is Readily Removed, When the Drawer is Out of the Cabinet, by Lifting the Retainer Strip at the Back of the Drawer

The size of the glass is 12 by 20 in. This glass top fits into grooves in the drawer sides and front, and is held at the back by a strip of wood, which is easily lifted out, permitting the glass to be slid out through the back of the drawer. Each drawer has a groove in each side on which the drawer slides to position in the cabinet, there being eight wooden strips, or drawer runs, on each side of the cabinet, which are a working fit in these grooves. The drawer runs are securely nailed and glued to the sides of the cabinet and permit each drawer to be removed and replaced independently of the others. The height of the cabinet as mounted on the legs, shown in the sketch, makes it convenient to take out any one of the drawers and set it on top of the cabinet.

The drawers are each 3 in. high, less the amount necessary for clearance between them, which will be about 1/16 in. or less, depending on the accuracy of the work. There should be a space of 1⅞ in. between the bottom and the glass, in order to permit an insect pin, 1⅝ in. long, to be used. The drawer front is grooved near the top for the glass, and near the bottom to take the drawer bottom. The sides are grooved correspondingly, and have the additional groove to rest on the drawer runs. The drawer back is made the same height as the distance from the drawer bottom to the glass, which, in the cabinet illustrated, is 1⅞ in. In the top of the drawer back is cut a deep groove, and the glass-retainer strip is planed off to fit into it, bringing the height of the drawer back to the same height as the sides. The various grooves may all be made with a groove or plow plane, but more exact work will be obtained by preparing the material at a mill, where there is a fitting saw. The drawers must all have the same horizontal dimensions, and these must be quite accurate, as otherwise they will not fit the case. The dimensions in the sketch are worked out on a 12 by 20-in. piece of glass as a basis; this should be kept in mind, if it is desired to change the dimensions and use some other size of glass. The bottom of each drawer should be covered with some material into which pins can easily be stuck, to hold the specimens. Sheets of cork, about ⅛ in. thick, are best suited for this purpose, but soft wood or corrugated packing paper will be entirely satisfactory.

In nailing the drawers together, the important things to be considered are the grooves to take the glass, which must coincide all around, and the grooves for the bottom, which should coincide quite closely for a neat job. The bottom of the drawer back should be flush with the top edge of the bottom grooves in the sides, and the top of the drawer back must be flush with the upper edge of the glass grooves in the drawer sides, to insure that the glass will slide into its place easily. Glue and nail the corners, but do not glue the bottom, or it may shrink and split, thus offering access to pests; instead, fasten it in place by nailing to the bottom the lower edge of the drawer back. The glass retainer should fit quite snugly, but not so tight that it cannot be removed easily. Note that the upper front edge of the glass retainer is beveled slightly to avoid danger of its catching on the bottom of the drawer above, when its own drawer is removed from the case. The bottoms of the drawers should be planed smooth all around, front and sides.

If it is desired to have all drawers interchangeable, which is very convenient sometimes when rearranging the specimens, it will be necessary to make the vertical dimensions of the drawers also very accurate. The sides of the cabinet can then be cut easily to dimensions, and the drawer runs set in place by measuring with a rule. Any drawer which does not fit in all eight places must then be dressed off until it does. If one does not care for the feature of interchangeable drawers, it is easier to follow this method: To find the length of the sides of the cabinet, stack the completed drawers, one upon the other, with a piece of cardboard between them to allow for clearance, and measure the extreme height of the pile, which will then be the length of the sides of the case. If it is found that there is much difference in the height measured at the four corners of the stack of drawers, some of them must be dressed off to bring the height at all four corners to the same figure. This height is then measured, and the sides are cut to it easily. Then, when the cabinet sides, top, and bottom are fastened together, pile the drawers in the case with the cardboards between them, numbering them from one to eight, so that they may always be put in the place where they are fitted. With a sharp pencil, or knife point, mark upon the back and front edges of the sides the exact location of the top of the drawer-run grooves in each drawer. The drawers are then removed, and the drawer runs are set by these marks, each drawer thus taking the exact position it occupied when the marks for the runs were made. The runs should be planed a little smaller than the grooves in which they are to fit, and should be securely nailed into place with 1-in. No. 16 brads. They should be glued for not more than 2 or 3 in. from the front edge, or there may be trouble, due to warping of the cabinet sides.

The width of the cabinet sides depends upon the depth of the drawer; the sides should be ⅝ in. wider than the drawers are deep, as a ½-in. back is used, and the drawers should rest ⅛ in. back from the front edges of the cabinet sides. Thoroughly dried quarter-sawed stock should be used for the cabinet sides, to insure against warping. Rabbet the back edges of the sides ⅜ by ½ in., to receive the back of the cabinet. Fit the back in place with its grain running horizontally, being careful that the sides are not sprung, or the drawers will not fit as they should.

Cut the top and bottom to the size indicated, and round the corners, as shown; they may, of course, be left square, but a good appearance will result if they are rounded, and care is taken that the rounded-off portion is confined to the part of the top and bottom which projects beyond the cabinet sides and drawers. The cabinet sides may be set in place on the bottom, and the top fitted to them, while the drawers are piled up inside. This will permit a good fit between the drawers and the sides of the cabinet, which is very important for easy working of the drawers. The top and bottom can be nailed with 8 or 10-penny finishing nails. If a finer piece of work is desired, the top may be doweled on, and the bottom fastened with 1¾-in. No. 10 screws.

If the case is to be set upon a table, the legs may be omitted; otherwise, they may be made as shown in the sketch, mitered and nailed at the corners, or glued together, as indicated. In this case, four of the pieces must be cut a little wider than the others, and they should be fitted so that the joint does not appear at the front. The legs may be fastened to the bottom of the cabinet by screws, as shown, but if a stronger fastening is deemed advisable, a block can be set inside the angle formed by the legs, and screws run from this block into the bottom and into the legs.

When all the drawers are fitted in their places, if they do not run easily, they should be dressed off until they do. Rubbing the drawer sides with paraffin will make them work more easily.

The stock list, giving finished dimensions of material required to make the cabinet shown in the drawing, is as follows:

8 Glass-retainer strips, ⅞ by ⅞ by 19 9/16 in.
16 Drawer sides, ½ by 3 by 13 in.
8 Drawer bottoms, ½ by 12⅝ by 20⅛ in.
16 Drawer runs, ¼ by ½ by 12⅝ in.
8 Legs, ⅞ by 6 by 5 in.
8 Panes of glass ("Single Strength"), 12 by 20 in.
2 Cabinet sides, ⅞ by 14 by 24 in.
1 Top, ⅞ by 15½ by 23⅞ in.
1 Bottom, ⅞ by 15¼ by 23⅝ in.
1 Cabinet back, ½ by 24 by 21⅝ in.
8 Drawer fronts, ⅞ by 3 by 20⅝ in.
8 Drawer backs, ⅞ by 1⅞ by 19 9/16 in.

Tin Cans Made into Tin Cups

An old tin can, especially of the smaller size much used for evaporated milk, can easily be converted into a useful drinking cup. This is especially a practical idea since the price of tin cups has gone up so greatly on account of the scarcity of tin, and because of the fact that the conservation program has found no important commercial use for old tin cans on account of the thin coating of tin which they are given.

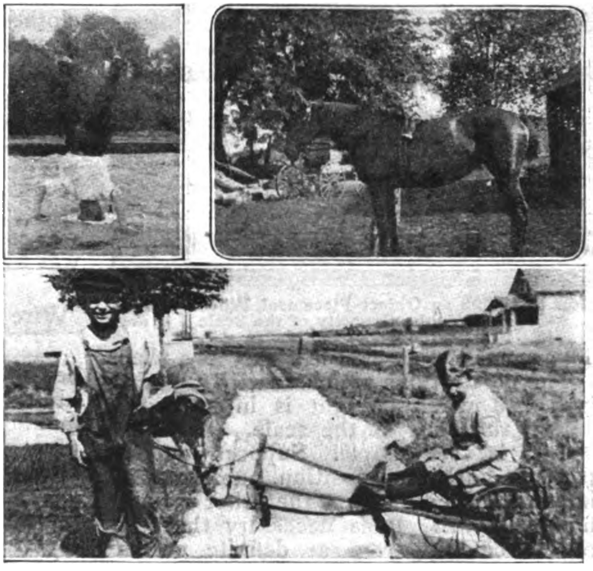
To make a tin cup of one of these old cans in this manner, it is best to use, if possible, an emery wheel, which is mounted so that the shaft does not project very far beyond it. Then, holding the can over the shaft, the top or cover sheet is ground so thin that it can be removed from the can. A smooth edge is left all around, which can be smoothed up further with a fine half-round file. A handle may be formed from a piece of another tin can, cut and bent to the proper shape, and soldered to the cup.—E. L. Howard, Springfield, Ohio.

Insulated-Wire Handle for a Pail

A handle which is as good as a wooden handle for the bail of a bucket consists of some large insulated copper wire wrapped around the bail and covered, if desired, with a layer of tape.

Photographs Illustrate Camouflage

Practical examples of "camouflage" are shown in these three photographs.



Three Photographs Which Prove That Camouflage can be Applied to Familiar Objects in Very Peaceful Surroundings

In the upper left-hand corner the man has adopted an effective, if somewhat strenuous means of making his appearance blend with his surroundings. To the right, the small rider on the horse's back is almost indistinguishable against the background of sky and trees, while the lower picture shows how difficult it may be to distinguish such a striking object as a goat.—A. J. Viken, Waterloo, Ia.

Weighing an Object Too Heavy for the Scale

Figures 1 and 2 illustrate how one may readily weigh upon scales an object whose weight is beyond the limit of the scales.

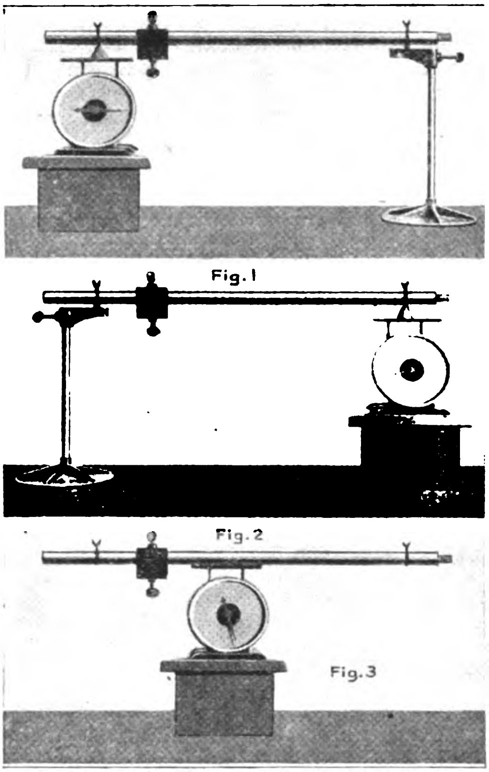


Fig. 1

Fig. 2

Fig. 3

How to Weigh an Object Piecemeal, Whose Weight Exceeds the Capacity of the Scale

The secret is to weigh it a part at a time.

The illustrations are made with a loaded iron rod whose weight is intentionally within the limit of the scale. The procedure is very simple. Support the object in a horizontal position, one end resting upon the scale pan, the other on any fixed support. It is necessary that the object be supported at definite points. Thus, in Fig. 1, the left end of the loaded rod rests upon a cork trimmed to a sharp supporting edge, which is used because its weight is negligible; the other end rests upon a lead pencil laid upon the supporting body. The dial in Fig. 1 registers 6 lb. Next, interchange the positions of the scale and the fixed support. The dial now registers 5 lb. The true weight of the body is the sum of the two readings (6 plus 5) or 11 lb., as verified by the dial reading in Fig. 3. If a spring balance is used, the operation is even simpler, since the object may be hung by loops of cord from the points in the two chosen positions.

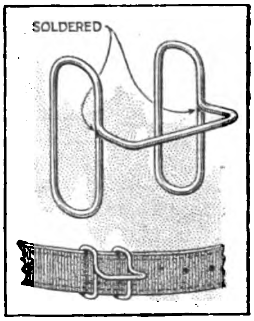
An interesting application of this principle appears in the use of platform scales in weighing a loaded vehicle, where the front and rear wheels are too far apart to permit both sets of wheels to rest upon the platform at once. Driving first the front wheels and then the rear wheels upon the platform and weighing, the two readings are added to obtain the true and total weight. This method is accurate only when the driveway is level with the platform. The axles represent the two definite lines of support. Similarly an animal may be weighed piecemeal on platform scales, placing first the front feet upon the platform, and then the hind feet. The posture of the animal must be the same in each trial.—L. Pyle, St. Louis, Mo.

Simple Way of Preventing Holes in Socks

A man who had to look after his own clothes repairs devised a simple way of preventing holes in his hose. When the heels or toes showed signs of getting thin, he employed small pieces of chamois, or any other thin, soft leather, to stop the wear. The leather was placed over the worn part and attached all around by a few stitches to the material where it was still strong. The leather wore well and was very comfortable, and much darning was avoided.

Wire Loop on Belt for Carrying Tools

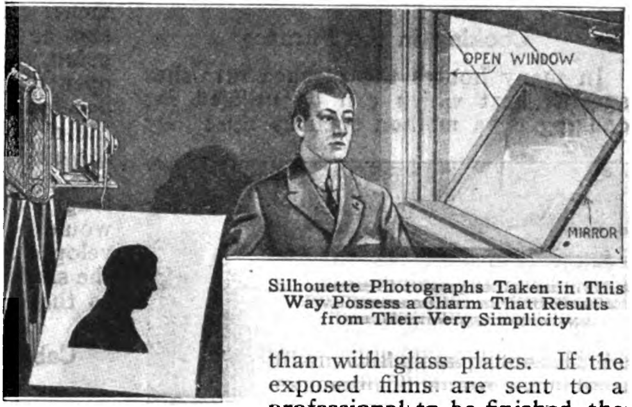
Mechanics using many small tools find belt loops very handy to carry them. The utility of the loops can be increased by making them so they may be moved along on the belt, or removed entirely. A simple tool loop with these advantages may be made from heavy brass or copper wire, No. 4 or 5 being suitable. The wire is bent into the shape shown, and the ends soldered. The loops should be made in different sizes to take the various tools used. Spring clips, permanently attached to the belt loops, will be useful for holding many small tools.



The Photographic Silhouette

The silhouette is returning to favor. The reason, perhaps, is that in the silhouette we have a type of portraiture which is so free from details that the imagination is stimulated to supply them. In viewing the silhouette of a friend one recalls vividly all those details of feature that do not appear in the outline representation. It is this powerful appeal to the imagination that vitalizes the silhouette. The cutting out of a silhouette by use of scissors is a most difficult and exacting art; but with a camera one may produce a silhouette that excels in both accuracy and effect the scissors-made type. No apparatus is required other than that possessed by every amateur photographer.

Choose a room that is lighted by a single window, or a room in which all windows but one can be perfectly shaded. Drape the upper half of the window with a light-proof cloth, and hang outside the lower half of the window a large mirror, say, 2 ft. square, in such a way that light from the overhead sky is thrown straight across the room. An ideal way is to have the bottom edge of the mirror rest upon the window ledge, the top of the mirror leaning outward at an angle of 45°, supported by strings or wires extending from the two upper corners back to the window frame. To make a silhouette of a friend, seat him close to the window, with the profile outlined against the patch of sky as seen in the mirror. Mount the camera back in the room at the desired distance from the subject, focus, and make an instantaneous exposure, or snapshot. Develop the negative until a very black sky surrounds the much underexposed head of the subject. Fix, wash, and dry the negative. Using any contrastive type of paper that gives a pronounced white and black effect, make a print of the negative in the ordinary way, obtaining a jet-black silhouette. In order that all the rest of the print may be a pure white, slip a piece of black paper between the negative and the photographic paper before the exposure and the development of the latter. The black paper should have a hole cut out of it so as to expose that region of the negative containing the sitter and the patch of sky. The head then prints out black, with an expanse of white background. The only precaution is to keep that side of the sitter toward the camera as dark as possible. It will be found that the process can be used somewhat more successfully with films than with glass plates. If the exposed films are sent to a professional to be finished, the above directions should accompany them, as the silhouette effect will be entirely lost unless the directions are followed closely.—L. Pyle, St. Louis, Mo.



Silhouette Photographs Taken in This Way Possess a Charm That Results from Their Very Simplicity

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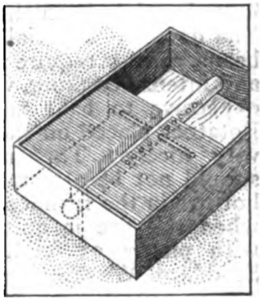
Converting an Ordinary Desk Drawer into a Card File

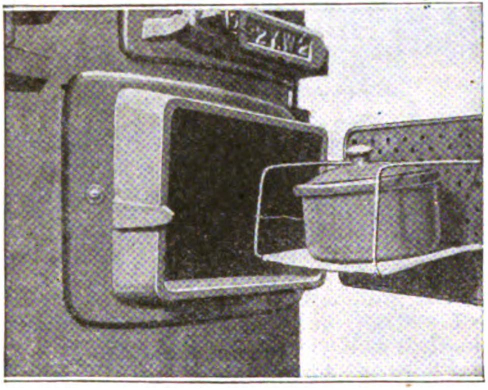
It is sometimes desired to use an ordinary desk drawer as a card file, the cards being arranged so as to face forward as in standard card files. Such drawers are often slightly more than twice the width of the card, making it convenient to arrange two stacks of cards side by side in the drawer. The remaining requirement is, then, some handy device to keep the cards from sliding out of place or falling over. This can be readily done by the use of a roll of pasteboard, such as a mailing tube, or made, if necessary, by splicing together two pasteboard tubes, in order to obtain the necessary length. The roll should be of such a size that, when slightly flattened, it fits in between the two stacks of cards. This forms a convenient separator, and the cards are prevented from falling backward by inserting, through holes in the pasteboard roll, a round stick, or a full-length lead pencil. The holes can be cut with a pocketknife at equal intervals along the roll. As new cards are then added to



the file, the stick or lead pencil can be removed from one hole and placed in the next one, so as to give sufficient room for the new cards.

Cooking in the Furnace

In many houses the furnace furnishes surplus heat which can be utilized for cooking by a method such as this: By bending some old iron wire to the shape shown, a rack or shelf is built onto the furnace door, on which a piece of sheet iron is placed to hold a large kettle. The device is especially useful for baking beans, as they require long hours of steady and intense cooking, which makes it quite expensive to bake them in a gas oven. Potatoes placed on the platform also bake very nicely. This method of cooking should not be attempted when there is a hot fire in the furnace, being suitable only when the fire is quite low and covered with plenty of fresh coal.—Mrs. C. F. Stoddard, Washington, D. C.



With a Low Fire in the Furnace Some of Its Heat may be Utilized in Baking a Kettle of Beans, Set upon an Iron Rack at the Furnace Door

Ribbed Glass for Auto Headlights

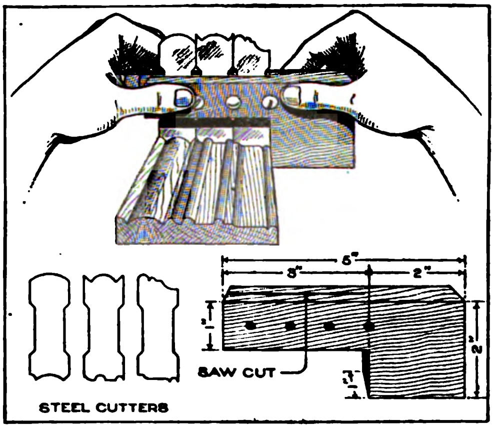
Probably the most widely adopted of the devices for reducing the glare of automobile headlights is the use of some form of rough-glass lens, so that the rays are diffused instead of being concentrated into a single beam. Such lenses can be bought in many different styles, but the cheaper way is to buy at a hardware store some ribbed or figured glass which is manufactured for use in windows. While this glass is usually not of so high a quality as the manufactured lenses, and may not give quite so good a light, the difference will not be great in most cases.

Photographs Taken in the Shade

If one has a camera which does not take good pictures except when the sun is shining brightly, try the following experiment: Take an ordinary subject in the sun, and then take another in the shade, using the same shutter speed and lens opening. Then, in developing, make the developer half strength; that is, dissolve the chemicals in twice as much water as the directions call for. This will necessitate developing the film or plate twice as long. Theoretically, the results obtained would be exactly the same, but when developed in this way, the subject taken in the shade will often be as clear and bright as the one taken in the sunshine.

Cabinet Moldings Made by Formed Scraper Blades

An amateur wood worker who occasionally liked to make moldings, but did not like to go to the expense of buying an expensive plane for the purpose, made a tool like the one here illustrated. The blades are simply pieces of sheet steel which may be made from an old scraper or saw. They may be clamped in the block and used in combinations of one, two, or three blades at a time, depending on the width of molding to be made. Various blades of different patterns can be made in a few minutes with round and three-cornered files, and when dull they can be sharpened with a few strokes of a file. While the method is not practical for making any large number of moldings, it is simple and cheap and makes it possible to turn out some beautiful work.—Chas. Illingworth, Mission City, B. C., Canada.

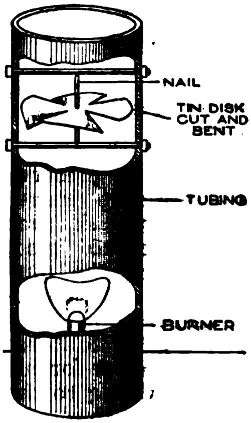


A Few Scraps of an Old Saw or Scraper Blade, Clamped in a Wooden Block, will Enable the Amateur to Make Moldings of Various Designs

Instrument Tests Gas Burners

When a gas burner is lighted and placed inside a tube or chimney, open at both ends, the speed with which the air inside the tube moves upward depends on the amount of heat developed in the flame. This fact is made use of in the simple instrument illustrated, to test the completeness of combustion produced by various forms of gas burners.

A 2½-in. brass tube, 10 in. long, was used, and near its top was suspended a fan, cut from a piece of tin can, and shaped somewhat as shown. It was mounted on a six-penny finishing nail, the head of which had been removed. The ends were ground carefully to a conical point, and the fan was balanced accurately so that it would revolve very freely, when mounted. This balancing was done by mounting the fan first between centers, with the shaft horizontal, and cutting away metal from whichever side proved to be the heavier.



Two bolts, made from brass rod, were passed through the tube, and small bearings for the ends of the fan shaft were made at the centers of these bolts. The bolts were set the proper distance apart to take the fan shaft between them, one being directly over the other.

When the fan is mounted in place, it is ready to use for testing burners. These should be supplied with gas through a valve, so adjusted that each burner consumes the same amount of gas per minute, this being measured by some suitable means. Each burner should be placed successively at the same point in the lower part of the tube, and left there long enough for the tube to heat up and reach a uniform temperature. The speed at which the air current causes the fan to revolve can then be counted, using an ordinary watch or a stop watch, and this speed is then a measure of the efficiency of the gas burner. Counting the speed of rotation of the fan will be much easier if one blade is painted with a white or red spot before balancing the fan, and greater accuracy is thus secured.—Dale R. Van Horn, North Loup, Neb.

Artificial Flowers Forecast Weather

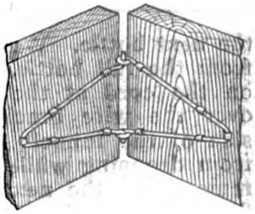
Paper flowers can be made to tell if it is going to rain or not. The petals are painted with a solution of cobalt chloride, a chemical which turns blue when the air is very dry, and is pink in damp air. By using different-colored papers, one can make a curious bouquet of flowers and leaves that will be the proper color only when fine weather is coming. White, pink, and yellow sheets are needed.

Use the white and the pink sheets for making up any kind of flowers desired. These can be mounted on wire or wooden stems. Then, out of the yellow paper, cut the leaves. Finally the flowers and the leaves are all painted or dipped in the cobalt solution, which can be made up as follows by any druggist: Cobalt chloride, 1 part; gelatin, 10 parts; water, 100 parts.

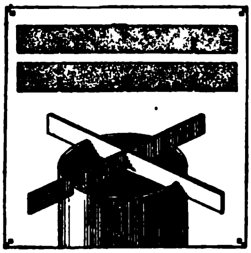
This is how the bouquet works: When rain is coming, and the air is damp, the flowers made of the white paper are pink; those made of the pink paper are also pink, while the leaves, which were made of yellow paper, are an odd shade of orange. This looks, of course, altogether "wrong." But when the air becomes drier—a sure sign of fine weather—the flowers made of white paper become bright blue; those made of pink paper are a fine violet shade, while the leaves are bright green.

A Hinge Made of Stiff Wire

A hinge for a light door, which is readily made of two pieces of stiff wire and a number of staples, is shown in the illustration. The two pieces are alike, except that one has its ends bent to form the pins of the hinge, while the ends of the other form the eyes in which they work. Each half of the hinge should be mounted in place, leaving one staple off until the door is hung, when the staple is driven which locks the two parts together.—P. T. Hines, Raleigh, N. C.

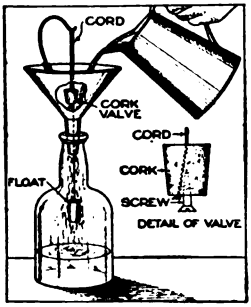


Oil Lamp Made into a Stove



An ordinary kerosene lamp can be converted into an oil stove, for heating water or cooking in small vessels, by substituting for the glass chimney a metal chimney, built as shown in the sketch. It consists of a piece of sheet metal rolled up and riveted, or a piece of small-sized stovepipe, or other thin tubing, may be used if handy. Over the top of the chimney two crosspieces of heavier sheet metal are set, as shown. The vessel rests on these crosspieces, enough space being left underneath for the escape of hot gases from the flame. The cross bars can readily be taken off and packed inside of the chimney for carrying, and this feature makes the device attractive for camp use. The convenience of changing the lamp instantly into a small heater will be clearly seen.—J. G. Allshouse, Vandergrift, Pa.

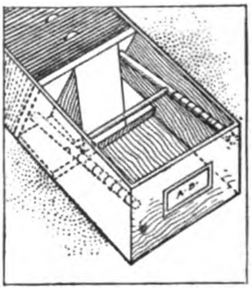
Safety Valve for a Funnel



With a funnel fitted up as shown in the sketch, it is possible to fill rapidly with liquid, a number of bottles, without close observation to see when the bottles become full. As the liquid in the bottle being filled reaches a certain level, the flow into it is stopped by the cork valve dropping into the mouth of the funnel, which can then be lifted out and inserted in the next bottle. When lifting the funnel from the full bottle, the finger is placed on the cord at the top, where it goes over the wire bracket attached to the side of the funnel; this keeps the float from dropping while the funnel is being removed to the next bottle. When the finger pressure is released the float drops, raising the cork, and the liquid begins to flow.

In order to have this device work satisfactorily, the principal requirement is that the float and the valve shall bear the proper relations of volume and weight to each other and to the liquid with which they are to be used. It is necessary that the float shall be heavier than the valve, and that the weight of the float in liquid shall be less than the weight of the valve in either the liquid or air. Besides these conditions, the valve must be of the right size to fit in the funnel. The float must be small enough to work freely in the neck of the bottle and heavy enough to overcome any friction of the cord. A good way is to make the float of varnished wood and the valve of a small cork with a metal screw in the center of its lower face. This screw is used merely as a weight, and its size should be such as to bring about the proper relation of weight as stated above. —Violet Johnson, Rockford, Ill.

Simple Follower for Vertical Letter File



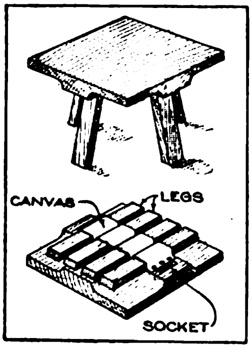
A factory clerk, wishing to preserve records in a vertical file in a deep drawer of his desk, was unable to get, through the purchasing department of his factory, a follower or support for his file. Going to the pattern shop, he had made a device like the one illustrated, which was found to work very well. The follower itself consists of three blocks nailed together; to hold it in place, there are two round wooden rods, which extend back to the rear end of the drawer. They were originally made long enough to hold the follower at its farthest forward position. At intervals of about 1 in. along the rods, slots were sawed deep enough so that a piece could be broken off with the fingers; then, as the file expanded, the pieces were broken off one at a time, thus allowing additional room for papers.

Labeling Bottles with a Dab of Paint

Bottles containing chemicals are readily marked in a durable way by painting a neat 2-in. square on the bottle in green paint, allowing the paint to dry, and scratching in the words or chemical formulas with a nail.—Abel Greenstein, New York, N. Y.

A Folding Portable Stool

The sketch shows a collapsible stool which is readily made from some scraps of lumber. The four legs are mortised into the top of the stool, which should be of wood, about 1¼ in. thick. These sockets should be sunk about ⅞ in., and the legs should fit them quite accurately. When the stool is to be carried, the four legs are simply pulled out and thrust into four loops of canvas, which are formed as shown. The excessive thickness of the block can be cut away around the corners in order to make the stool lighter for carrying.—Pvt. Elmer Tetzlaff, Camp Alfred Vail, N. J.



Put Out Light in Going to Sleep

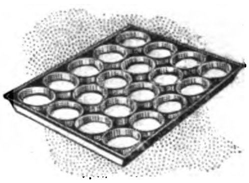
Many persons find that the easiest and quickest way to get to sleep at night is to start reading a book or magazine and gradually "doze off." One objection to this habit is that the electric light often burns all night and wastes much current. To prevent this waste, use a pull socket, and tie a string to the end of the chain; tie the other end of the string to the book, so that as it drops from the hands the light will go out.

A Handle for Safety-Razor Blades

A very useful handle for holding safety-razor blades while they are being sharpened can' be made as shown in the sketch. An old spoke from a bicycle, carrying the nut which fits in the bicycle rim, is bent double, and a piece of tubing is slipped on, which is closed at one end, except for a hole big enough to take the spoke. This part of the device may be obtained from an old fountain pen or penholder. The blade is clamped quite tightly by screwing up the nut.—F. M. Viall, Vandalia, Mich.

Muffin Pan Made of Lids from Tin Cans

A muffin pan which gives good service is shown in the illustration. It was made from a number of lids taken from baking-powder cans, fastened into an old shallow pan which was no longer useful for its original purpose. The can lids are held by an aluminum or copper rivet through the center of each; solder must not be used, as it might melt if the pan became overheated.

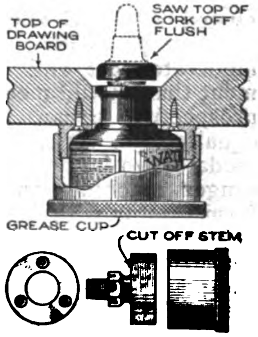


Flexible Drawknife Made from Piece of an Old Saw

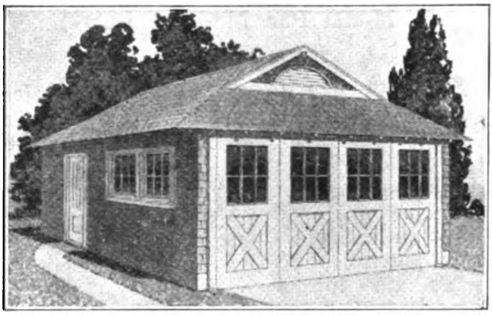
A useful tool in woodworking is a flexible spokeshave, or drawknife, made from the blade of an old saw. A strip, 1 or 2 in. wide, is fitted into handles at the ends and is ground to a sharp edge. The tool makes a good substitute for a more expensive drawknife, and will handle some jobs even more effectively, as the cutting edge can be sprung to fit curved surfaces.—G. A. Vogel, Baltimore, Md.

Novel Ink-Bottle Holder Made from Grease Cups

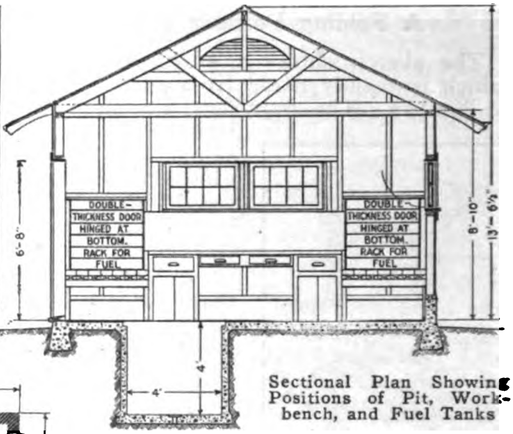
Of the many types of ink-bottle holders for draftsmen which can be purchased or made, few excel for cheapness and convenience the one here illustrated. The bottle holder is simply a grease cup such as used on automobiles, with the bottom cut off; the cup is inverted and fastened with screws to the underside of the drawing table. A hole is made to take the stem of the bottle, and the top of the cork can be sawed off so that it is flush with the surface of the board or table. A No. 2 grease cup is the right size to take the ink bottle. The kink is equally useful for drawing boards, if the farther edge is elevated so that the cup can be inserted underneath.—Frank Ziebell, Jr., Maywood, Ill.



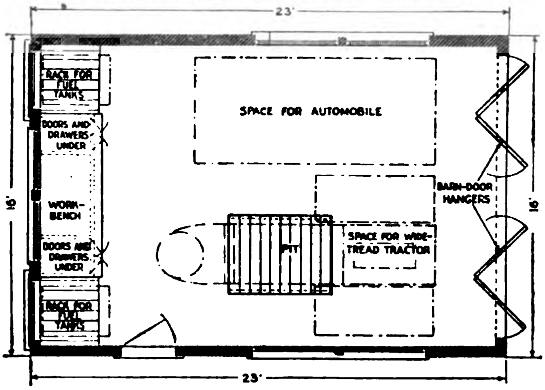
WELL-PLANNED GARAGE FOR TOWN OR COUNTRY



In This Garage, Sightliness and Convenience of Arrangement are Combined with Moderate Cost. The Structure is Equally Suited for Farm and City


DOUBLE-THICKNESS DOOR HINGED AT BOTTOM. RACK FOR FUEL
DOUBLE-THICKNESS DOOR HINGED AT BOTTOM. RACK FOR FUEL
6'-8"
8'-10"
13'-6½"
4'

Sectional Plan Showing Positions of Pit, Workbench, and Fuel Tanks



Floor Plan Describing General Interior Arrangement of the Garage, Which Is Large Enough to Accommodate Two Seven-Passenger Motor Cars, or One Car and a Tractor

NOW that motor-car production is once more on the upgrade and there is no restriction on building operations, ideas for the private garage may be discussed appropriately. Illustrated herewith are plans for a two-car structure of moderate cost and convenient arrangement that should meet the needs of many prospective urban and rural builders equally well. It will comfortably accommodate two large cars, or one seven-passenger machine and an average-sized farm tractor with broad creeper treads.

It is a frame structure, well lighted and ventilated, with concrete foundation, floor, and pit. The floor drains toward the middle, and the pit is 4 ft. wide, 4 ft. deep, and 5 ft. long. Shingles being both durable and, in comparison with other material, reasonable in price, serve excellently for siding as well as roofing. They may be stained, painted, or left in their natural state, as desired.

Cost obviously depends considerably on locality. Under normal conditions the garage should be erected at a total expense ranging from $650 to $750. If the owner assists in the construction work, the labor charge could be reduced. The materials used ought not cost in excess of $450 this spring.

Reference to the accompanying plans will show that an ample workbench with conveniently situated drawers and inclosed shelves is provided at the rear of the room, and that double windows immediately above it give ample light. At either end of the bench places are designed for fuel tanks which are so arranged that in districts where it is customary to distribute fuel in drums, the latter may be loaded into place from a wagon at the rear without having to be lifted.

The doors are mounted on sliding hangers and may be pushed out of the way, leaving the entire entrance space unobstructed. The eaves overhang sufficiently to protect the interior of the garage on rainy days when the doors happen to be left open. Ventilators are built in the opposite ends of the gable.

Sightliness, no less desirable on the farm than in town or suburb, is one of the attributes of the building. Furthermore, the exterior architecture is of a neutral type that lends itself to almost any site, regardless of the style of surrounding buildings.

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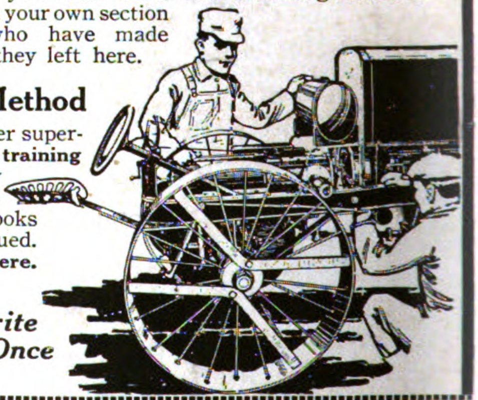

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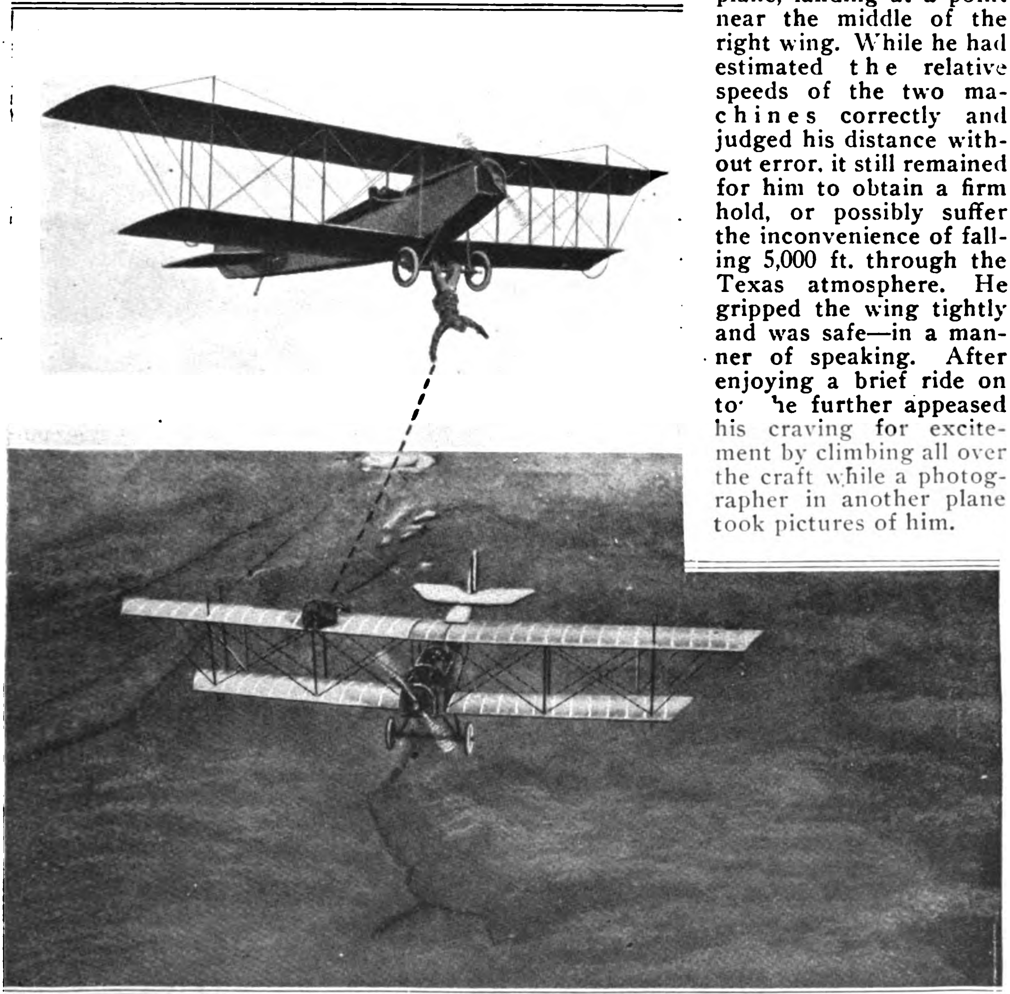
Vol. 31 MARCH, 1919 No. 3

Daring Flier Changes Planes in Mid-Air

FEW persons probably would care to emulate the aerial flip-flopping of a young lieutenant of aviation who recently accomplished the daring maneuver of changing planes while in full flight a mile above a Texas training field. Climbing down to the undercarriage of the machine in which he had left the ground as a passenger, he reached the horizontal bar of the landing chassis. Hanging to this, and executing acrobatic evolutions, he awaited the approach of a second ship flying at a lower level. As it came beneath him, he released his hold and dropped onto its top plane, landing at a point near the middle of the right wing. While he had estimated the relative speeds of the two machines correctly and judged his distance without error, it still remained for him to obtain a firm hold, or possibly suffer the inconvenience of falling 5,000 ft. through the Texas atmosphere. He gripped the wing tightly and was safe—in a manner of speaking. After enjoying a brief ride on top, he further appeased his craving for excitement by climbing all over the craft while a photographer in another plane took pictures of him.



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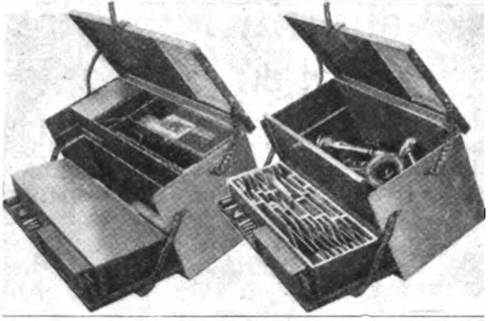
Accompanying the Pictures Above, Which Illustrate How the Maneuver was Accomplished, Comes a Note from the Photograph Agency to the Editor, Asserting: "The Photographs are Vouched for by Him (the Officer) as Being Authentic. We Have a Written Statement to This Effect"

ORDNANCE CAR'S "FIRST AID" IS COMPACT TOOL BOX

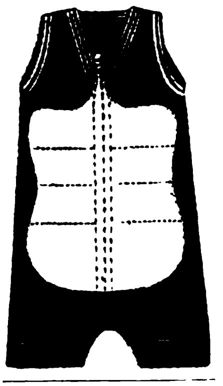
Tool boxes provided for use on all cars, trucks, and tractors of the Ordnance Department are not only complete in their equipment but are designed to give each tool or supply its own compartment. Besides the usual wrenches, screwdrivers, hammers, and pliers, each box carries a heavy jack, towing chains, a box of waste, scrapers for carbon removal, extra oilcans, electric flash lights with extra bulbs and batteries, friction tape, extra magneto parts and generator brushes, head-lamp bulbs, and a small drawer of duplicate nuts and lock washers for all parts of the vehicle, each in its own little cell.



There Is Little Waste Space in This Tool Box When It is Completely Equipped for the Cars, Trucks, and Tractors of the Ordnance Department, and Every Item Has Its Own Compartment

BATHING SUIT OF NEW DESIGN KEEPS WEARER AFLOAT

Of special interest to timid bathers is an unsinkable bathing suit outwardly resembling an ordinary swimming suit, but equipped with an inflatable portion on the inside of the front. This bladder is made of rubberized material which becomes waterproof on being wet. The bather, after immersing his body enough to wet the garment, inflates the bladder by blowing through a valve in its upper end. It is then capable of supporting persons weighing up to 300 lb. in the water, it is claimed.



RUDDER OF DIFFERENT TYPE ON HOG ISLAND SHIPS

Congestion of forges and foundries in the Hog Island shipyard led to an emergency design of rudder that proved to have some permanent advantages. Cast-steel and forged rudder frames being impossible of delivery in adequate quantity, a semibalanced type of rudder was laid out to use plates and standard sections. It is 23 ft. 10¾ in. from the coupling to the bottom of the rudder, 6 ft. 10 in. from the stock to the rear or after end, 3 ft. 5 in. to the forward edge of the balancing end, and 18 in. wide near the sternpost, tapering to 8 in. at the rear end. The only casting is used where the side plates are riveted at the top, serving as a coupling for the rudder stock. This form of rudder, being hollow, has a certain degree of buoyancy, relieving the strain on the bearings so that only two are used. A stern was also built up with a minimum use of castings by the substitution of steel plates wherever they could be used.

WATCH WITH GAS-PROOF CASE FOUND ON HUN CAPTIVE

Paralleling the famous "two sets of suspender buttons" of the German army equipment is a watch provided with a gas mask taken from a captured German soldier. A false case with a glass front is so constructed that when it is closed, with the watch inside, no corrosive enemy gas can enter the works and injure the delicate mechanism. The observed action of such gases on exposed articles indicates some reason in the German idea.

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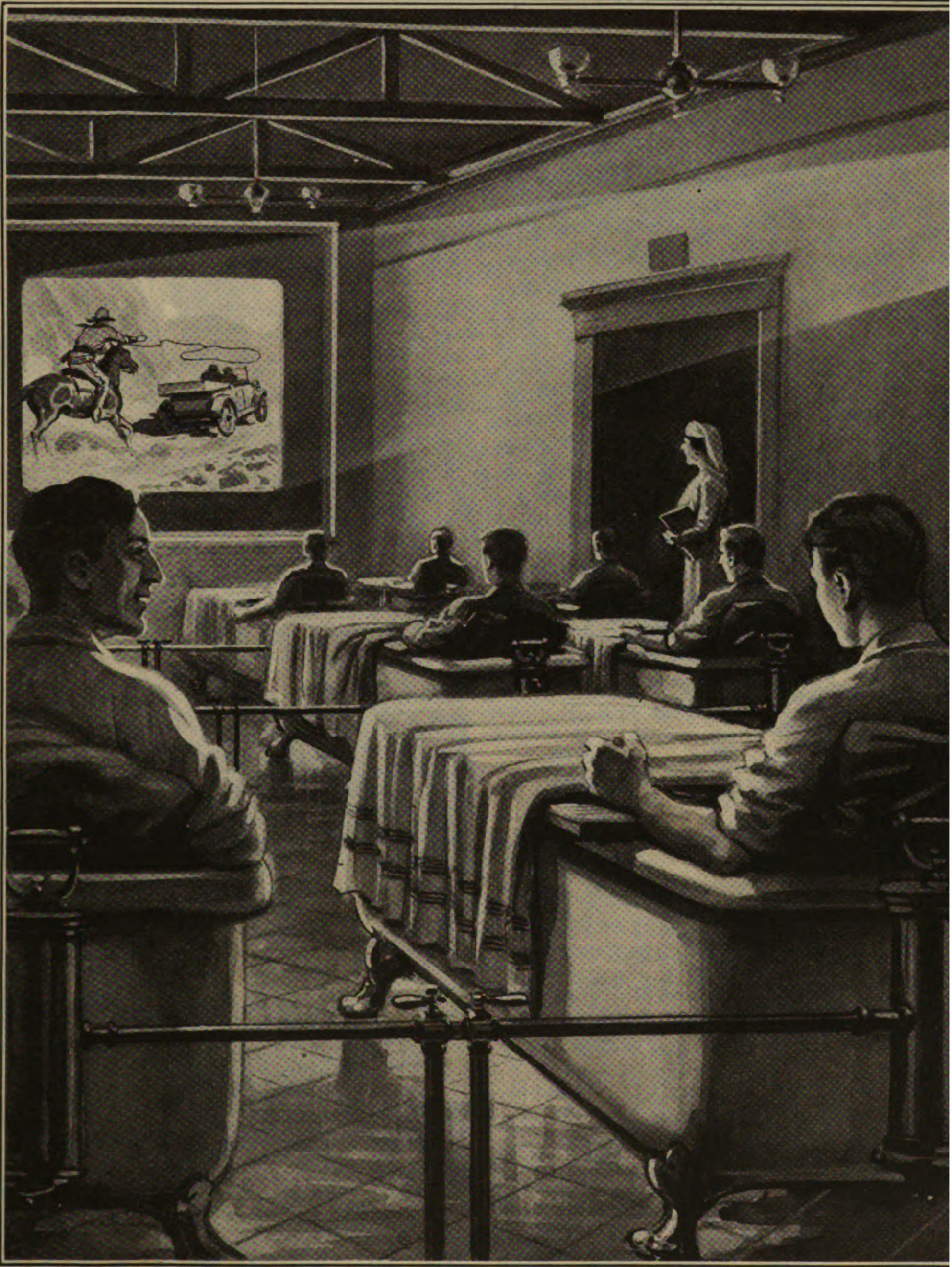
¶Mexican business houses are complaining that orders they send to manufacturers in the United States frequently are not acknowledged, and even their subsequent telegrams are ignored. American consular officers point to the importance to buyers in foreign countries of prompt information as to the receipt of orders and probable date of shipment.

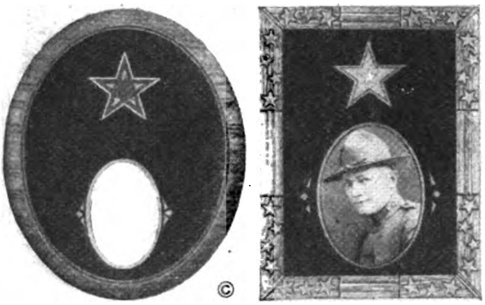
BATHTUB MOVIE SHOWS FOR WOUNDED SOLDIER



THESE men, who apparently are taking entertainment with their baths, after the fashion prevalent in ancient Rome, really are wounded American soldiers. Unable to go to any kind of a show, the Y. M. C. A. has brought one to their hospital at Cambridge, England. Here they sit constantly in water up to their waists, kept at 98° F. by continuous flow. This cleansing process has been entirely successful in healing serious septic wounds, many of which threaten the loss of a limb as the least of their consequences. The tubs are provided with air pillows and cushions, and a covered wooden lid which serves as a table or lapboard. With a fair-sized screen installed at one end of the hall, the men have been able to enjoy movie shows twice a week; and when the show is over, they simply switch out the lights, and the tubs turn into beds.

FRAMES FOR SOLDIERS' PHOTOS HAVE DISTINCTIVE FEATURES

A maker of artistic bric-a-brac has displayed unusual skill in fashioning frames of special designs for pictures of men in the service. One of the rectangular frames is of gilded wood appropriately carved with stars and bars. The picture occupies an oval in the lower half of a dark-purple field, and above it is a blue service star with a gold border and embellished in the center with mother-of-pearl, or a plain gold star. Other frames, equally attractive, are oval and of dark wood, while the mat is of any shade suited to the color of the wall. In one frame, a red border just inside the frame surrounds the field, which is white.



Handmade Frames for Soldiers' Pictures: The One at the Left Is of Dark Wood, the Other Is Carved and Gilded. The Stars are Embellished with Mother-of-Pearl

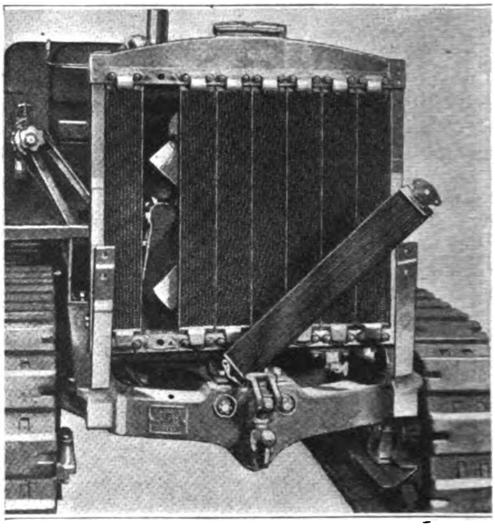
FLIER LANDS BIPLANE SAFELY AFTER LOSING MOTOR IN SKY

To an American lieutenant of aviation, in advanced training at an overseas flying field, belongs credit for making a forced landing in safety after wrecking his plane at an altitude of one mile. Collision with another machine tore the engine from the officer's craft, thereby destroying its balance. But for an exceptional display of coolness and ingenuity, the pilot's flying days would have been over. He grasped the one opportunity that offered itself, however, and lives to tell the tale.

At a moment when the plane was gliding on an even keel, he climbed onto the top of the fuselage at full length and in some manner managed, by continually shifting his weight, to restore balance sufficiently to prevent the craft from fluttering into a direct fall. The airman realized that the odds were all against him, but he kept his head as coolly as if he had been in no danger at all. While maintaining balance with his body, he also manipulated the controls and guided the machine earthward. At the conclusion of his long, harrowing descent, he negotiated a landing that is described as having been worthy of a finished pilot working under normal conditions.

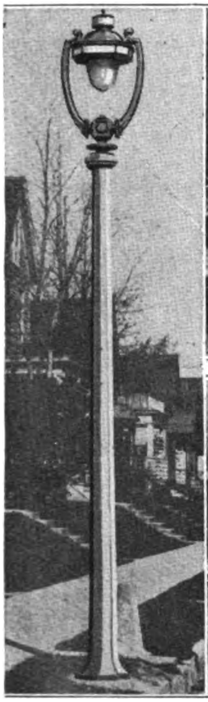
SECTIONAL RADIATOR AIDS TRACTOR REPAIRS

Radiators of artillery tractors, besides being protected by armor plate, are made in sections for quick removal and repair. Each sectional unit has cast-iron headers top and bottom, with posts which connect with the circulation system when the sections are bolted in place. Vertical steel channels connecting the iron headers give rigidity and strength to the sections. The cooling capacity of the whole radiator is sufficient to handle its duty with one section cut out. The damaged section may be removed, solid gaskets substituted for the pierced ones to stop the flow of water, and the dead section replaced. This is done to prevent the fan from pulling an excess of air through the vacant spot in the radiator. The change from an injured section to a new one, however, takes only about 10 minutes.

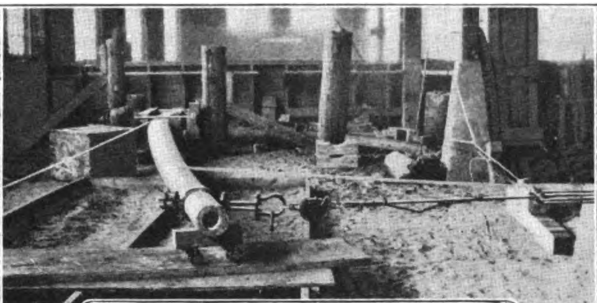


A Radiator Constructed in Sectional Units Makes It Possible to Repair the Cooling System of This Artillery Tractor in 10 Minutes

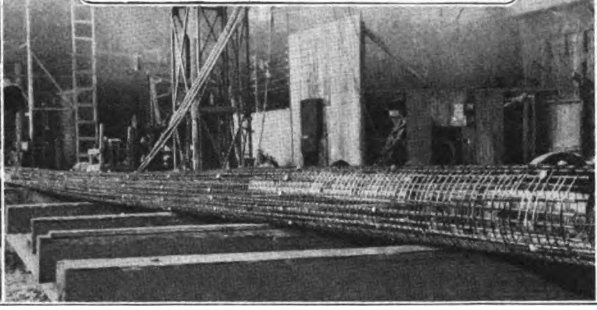
Potash from the extensive deposits of Alsace is suggested as a valuable ballast cargo for returning American ships. The supply is estimated to be adequate for America's annual need of 500,000 to 600,000 tons.



The Hollow Concrete Pole may be Made Ornamental as Easily as Plain



In Testing for Breaking Stress, the Hollow Concrete Pole Exhibits Considerable Resiliency, Bending Several Inches. The 30-Foot Pole Broke at 4,550 Pounds



The Reinforcing Cage is Made of Long Steel Rods Bound with Wire and Tied at the Intersections. When It Is in the Rotating Mold the Centrifugal Force Drives the Concrete into Every Crevice

Here Is Another Example of Simple, Yet Ornamental, Lighting Standards

ICELAND RIVER TO OPERATE BIG POWER STATIONS

Six power stations planned for early construction in Iceland will take from the Thjorsa, the island's largest river, a total of 1,114,000 hp. This stream, from 5,000 to 8,000 feet wide, has three important tributaries that drain the southern part of the country. The slopes here are gentle and development possibilities favorable. Climatic conditions are not severe, and the absence of ice difficulties, rafting of timber, and organized fisheries simplify the power company's problems. The production of chemical fertilizers and the nitrates and sulphites of ammonium is suggested as one use for the power developed, as the country abounds in sulphur deposits. For commercial and lighting purposes, electric current can be delivered at Reykjavik, less than a hundred miles distant, at a reasonable cost.

¶Mixtures of lime and coal dust are found to form excellent plant fertilizers. The lime accelerates the normally slow process of the soil in extracting carbon dioxide. The coal dust may be had as a colliery waste.

ROTATING CONCRETE MOLD FORMS HOLLOW POLES

Molding concrete shapes to meet special requirements is a problem more commercial than mechanical. By its very nature concrete finds no difficulty in filling any mold. Hollow concrete poles have been previously used in a limited way, but a commercially practical and economical production method is a recent development. The long horizontal mold is split longitudinally into two parts. In this mold is placed the reinforcement, a cage of longitudinal steel rods bound with wire and tied at the intersections. The wet-mixed concrete is poured in after the halves of the mold have been bolted together. The mold is clamped in a machine consisting of a tube that is rotated at a gradually increasing speed, and the centrifugal force compacts the concrete against the wall of the mold so strongly that all interstices of the reinforcement are filled and close cohesion attained. The action also separates the surplus water from the mixture and it escapes at the large end of the mold, leaving a concrete so compact that the pole, after having been given a special steam treatment, may be safely removed in a short time. On a 30-ft. pole, with 7-in. top and 14½-in. butt, weighing 1,900 lb., tests made by applying pulling stress two feet from the top indicated a safe load of 4,050 lb. The pole broke at 4,550 lb., bending more than 13 in. before failure. The process is applicable to poles of practically any size, ornamental or plain. It is therefore useful for making telegraph, telephone, and signal poles, and electric-light standards, which may be as elaborate as desired.

NEW INVENTION MULTIPLIES CAPACITY OF PHONE WIRES

An achievement more extraordinary by far than making two blades of grass grow where one grew before, is the sending of five telephone conversations simultaneously over one pair of wires where but one conversation could travel before. The new apparatus, or system, which makes this feat possible is known as the multiplex telephone, a report on which has recently been given to the government and which marks a new epoch in the history of communication by wire. The new invention also makes it possible to send 40 telegraph messages simultaneously over one pair of wires, or they can be used in part for telephoning and in part for telegraphing. Ten conversations can be carried on over two pairs of wires which formerly could be used for a maximum of three conversations by means of the so-called "phantom circuit." Tests covering several weeks have been made of the system on a Baltimore-Pittsburgh line and have been pronounced successful in every way.

To carry five conversations over a single pair of wires it is necessary to send over the latter five different electric currents at the same time, and to provide means so that at the ends of the wires these currents shall be completely separated and go to their respective instruments. This is done by adding to each ordinary telephone current a carrier current of definitely higher frequency, the differences in wave lengths being adjusted to the separating devices at the receiving end. An improvement of the audion forms an important part in this remarkable apparatus, which will be installed on all long-distance lines. The cost and other factors make its application to short, local lines impractical. The invention will enormously increase the capacity of existing lines for telephone and telegraph service.

WIRE APRONS OF SKY INJURED MORALE OF GERMAN FLIERS

Sky aprons, consisting of fine steel wires suspended from horizontal cables supported between kite balloons, constituted an important part of the aerial defense system of London in the latter months of the war. It will be recalled that in April last year Popular Mechanics briefly described the anti-aircraft nets protecting Venice from Austrian bombers. At that time censorship withheld many details of the plan. It is now permissible to state that aerial aprons owe their invention to the British, who were the first to use them.

Balloons were sent up in groups of three or more to different elevations. The apron of wires they supported might be likened to certain Japanese beaded portières, except, of course, that the individual strands were spaced several yards apart and weighted with plumb bobs.

One of the most beneficial effects of the scheme was its pronounced influence on the morale of German airmen, who knew not where they might encounter the menacing wires. Striking one of them while flying at high speed might have serious consequences. It might cripple one of the controls, wrap around the propeller, saw through a spar, or, if it happened to be one of the main anchor cables, shear off a wing. The aprons are said to have spelled the doom of a number of night bombers and to have caused others to make forced landings.

In guarding London, the atmosphere was divided into three defense strata. Between the ground and a certain elevation the aprons gave protection. The artillery barrage formed a curtain of deadliness across the middle area. Above that were the night-duty fighting planes of the Royal Flying Corps, waiting the chance to attack.

PHONOGRAPH WITH GLASS HORN HAS BETTER TONE, IS CLAIM

An innovation in phonographs is an instrument equipped with a horn of beveled mirror glass. The claim of the makers is that the horn of a talking machine best amplifies the tone when its surface is smooth and rigid, hence one of heavy glass is preferable to one of wood or metal. Furthermore, the glass amplifier adds much to the attractive appearance of the instrument when the front is open.

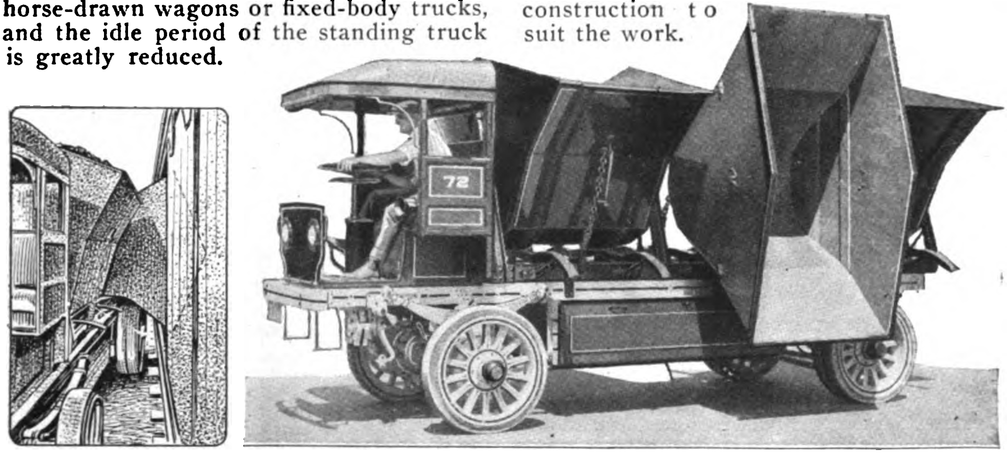
Tent Menders, Employed by a Fruit Growers' Association in California, Repairing Tents Which are Used as Covering While Fumigating Fruit Trees: This Association Has Enough Canvas to Cover All the Trees in a 10-Acre Orchard at Once

TRUCK DUMPS GRAIN LOAD IN FREIGHT-CAR DOOR

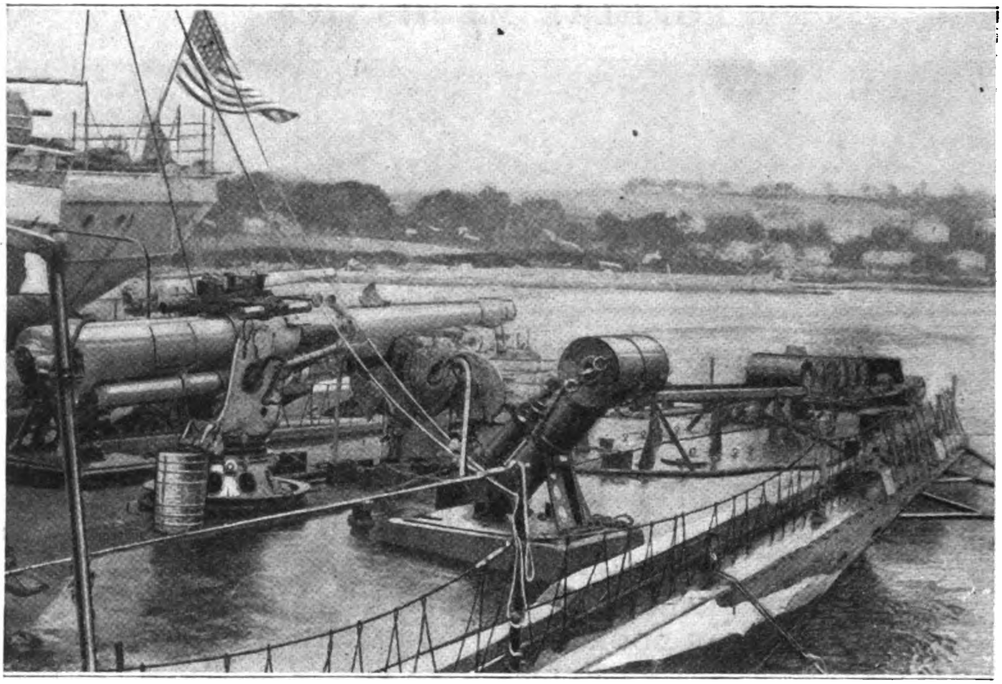
An electric truck, used for hauling grains and feed, has a side-dumping body so designed that each of the three independent sections fits a standard freight-car doorway. As the driver pulls up alongside a freight car, he tips the first section of the body directly into the car door, and it deposits its load on the floor of the car. The first section is righted, the truck moved slightly forward, and the second section dumped, followed by the third. Two-thirds of a section load is emptied automatically, the rest being shoveled out by a man in the freight car. A considerable labor-saving results over the methods of shoveling a full load from horse-drawn wagons or fixed-body trucks, and the idle period of the standing truck is greatly reduced.

TENT REPAIRING A BIG TASK IN WESTERN FRUIT LANDS

Tent repairing which has nothing to do with circuses, camping, or army life, is an industry conducted on a large scale in southern California. The tents in question are used in covering fruit trees while they are being fumigated. One coöperative association of fruit growers has enough canvas to cover all the trees in a 10-acre orchard at once—much more, it is said, than is owned by any circus company. With so many tents in use there is much mending to be done of tears, and holes eaten by the acid fumes. This association employs three to five tent menders from four to six months each year. They are provided with sewing machines which are of heavy construction to suit the work.



As the Sketch at the Left Indicates, This Truck Dumps Its Load of Grain Directly upon a Freight-Car Floor, the Body Sections Tilting into the Car Door. The Driver Does the Tilting from His Seat, Emptying the Truck in a Hurry



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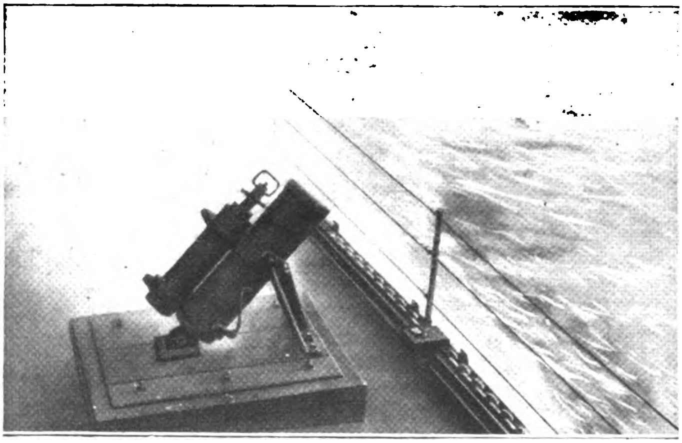
Visible on the Quarter Deck of This United States Fighting Vessel Are "Ash Cans" Leashed to a Launching Rack, a Mortar Loaded with a Depth Bomb, and a Four-Inch Gun—All Deadly Enemies of the U-Boat

U-BOAT BEATEN BY Y-GUN AND "ASH CAN"

AS is known to the whole world, the submarine menace was not a mere bugaboo. For a disheartening period it threatened to bleed the allies and throw the balance of power in favor of the Hun. The defeat of the U-boat was, therefore, a triumph of utmost importance. And for making this possible, credit is due in great measure to the depth bomb, or the "ash can," as it is known in naval vernacular.

Those skilled in the genealogy of ordnance might trace the history of this deadly weapon back to the early days of fishing, but so far as the landlubber is concerned, the depth bomb as now constituted is peculiar to the great war. Essentially it is a steel drum loaded with a 350-lb. charge of T. N. T. At one end is a timing dial, and at the other a safety fork. The former consists of an indicator hand and a metal ring on which various depths from 40 to 150 ft. are stamped. By turning the pointer to one of these numbers, adjustment is made of a delicate spring which affects an internal diaphragm that is acted upon by the pressure of the water. When the bomb reaches the predetermined depth, the detonator is released, causing it to explode. Before it is launched, however, the so-called safety fork, which normally prevents



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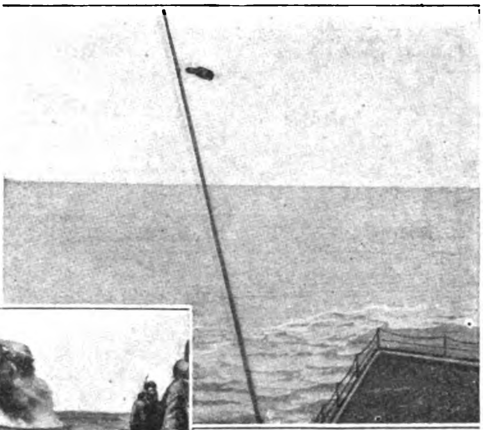
This Gives a Close-Up View of One of the Depth-Bomb Mortars a Split-Second Following Its Discharge. The Firing Chamber, It will be Observed, is Attached to the Top Side of the Barrel

accidental discharge, is drawn out, so that the interior mechanism is free to operate.

The effective radius of a depth bomb is about 150 ft. In other words, it will cripple if not crush a submarine lurking within that distance at the moment of discharge. When once released, it falls like a plummet to the desired depth and explodes. For that reason it cannot safely be dropped from the stern of other than a fast-moving vessel, and even the latter is frequently lifted half out of the water by the terrific force of the concussion. In the early months when depth bombs first began to be used by our sailors, the sterns of the lazy-moving craft sometimes were blown off. Not a few bobtailed boats were towed to dry docks in 1917.

In action, three methods were commonly used for launching depth bombs. In the beginning they were merely thrown over the stern. Then an inclined rack, on which eight or ten of them could be leashed securely, was adopted. When an ash can was to be dropped, the ropes holding the sternmost one were cut, allowing it to roll off the end of the structure and fall into the water. Finally an improvement on this method appeared in the form of a lever-controlled rack manually operated. The merit of this arrangement, however, was chiefly



A Depth Bomb, Fired by a Mortar, on Its Way to Crush a U-Boat: The Rod at the Rear Is the Arbor to Which It is Clamped

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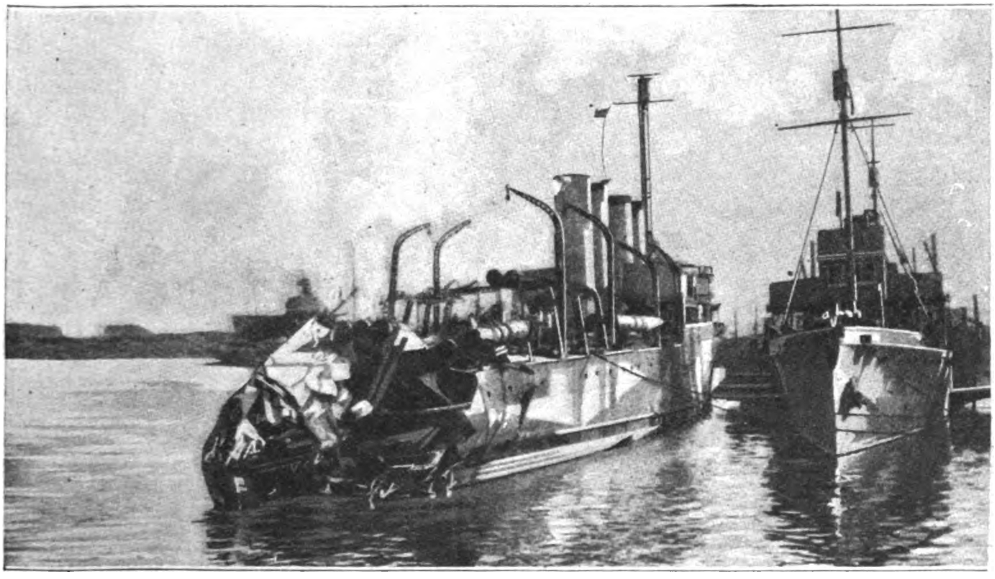
A Mountain Peak of Water Rises into the Air Following the Terrific Explosion of a Depth Bomb beneath the Surface



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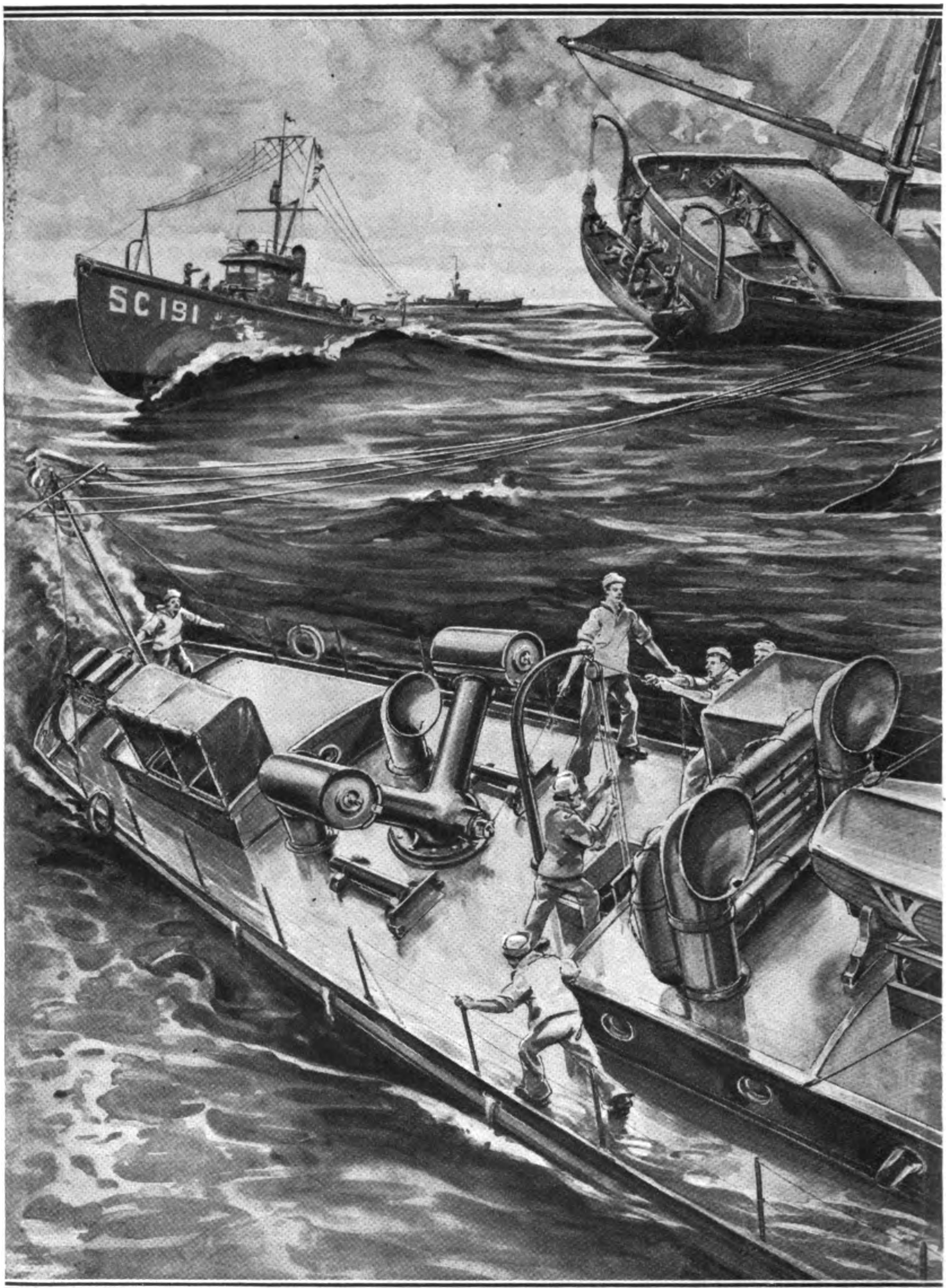
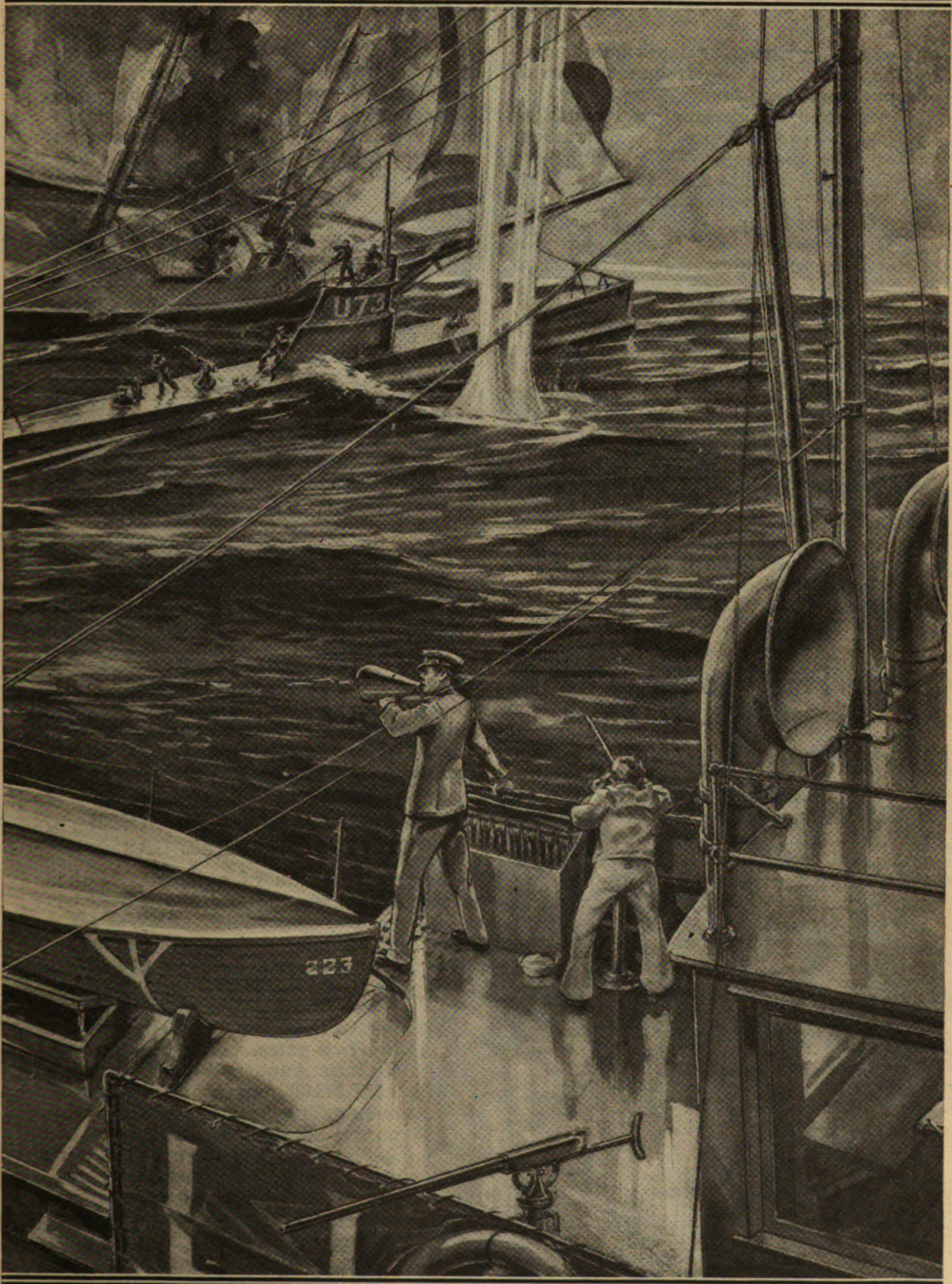
Showing the Condition of the United States Torpedo Boat "Manley," Whose Stern was Demolished by the Explosion of Depth Bombs That Were Aboard When It and a Merchant Vessel Collided: The Accident Was a Tragedy, for Many Lives were Lost on Both Ships



Sacrificing Little in Realism and Detail for the Sake of Action, the Artist Depicts a Thrilling Moment dur
After Approaching from the Port Side of the Three-Master, Two American Submarine Chasers are Getting
Has a Machine Gun Trained on the U-Boat's Deck. In Studying the Arrangement of the Near Chaser
of the Quarter-Deck. Leashed beneath It to the Deck Are Extra Arbors, While Immediately Forward Is the
the Inclined Rack from Which Depth



ing a Surprise Attack on a U-Boat in the Act of Sinking a Helpless Schooner. Slipping around the Stern,
into Action. "S C 191" has Overshot the Hun with Its Three-Inch Piece, While the Craft in the Foreground
It will be Observed That the Y-Gun, Ready to Discharge Its Depth Bombs, is Situated in the Middle
Davit with Which Reserve "Ash Cans" are Raised through the Hatch. Abaft the Hatches will be Noticed
Bombs are Launched over the Stern

one of convenience, for depth bombs cannot be dropped at too frequent intervals without countermining.

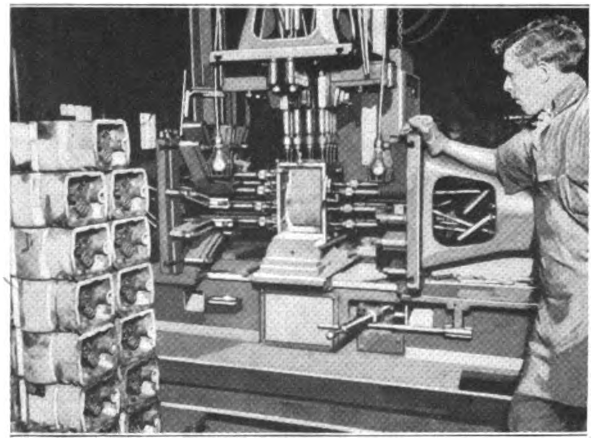
The second device employed consisted of the so-called Y-gun, an instrument shaped like the letter "Y," having two barrels placed at about right angles. This was ordinarily mounted crosswise in the middle of the after gun deck of a "sub" chaser and used for its firing charge a blank 3-in. cartridge. It hurled two bombs, one to starboard and the other to port, a distance of about 150 ft. Lastly, there was a squatty mortar that was employed usually on vessels other than chasers. Guns of its type were mounted on deck, at each side of a boat, and were of greater range than those of the aforementioned kind. The firing chamber consisted of a cylinder attached to the top side of the mortar's barrel. In each instance arbors were clamped to the depth bombs for gun use. Thus the scheme was essentially the same as with the better-known trench mortars, which also fired bombs with arbors attached.

The stern rack and the Y-gun enabled our chasers to employ an effective form of attack. Pursuing a U-boat, one of these craft raced to the point where the periscope was seen to disappear beneath the surface. In as rapid succession as safety permitted, ash cans timed for different depths were released at the stern. At short intervals the Y-gun hurled bombs to each side. As far as possible, the course of the U-boat was followed. This not availing, the chaser circled the area under suspicion.

It is not difficult to understand the logic of the system when the effective radius of the depth bomb and the range of the Y-gun are considered. A missile was dropped astern, for instance, and a moment later the Y-gun hurled two others 150 ft. from each side of the ship. Thus a triangle, with the first-launched "can" as its apex, was described. The effective area of each bomb slightly overlapped that of the other two. Therefore the force of the three explosions covered a triangular area that, roughly considered, was 600 ft. across at its widest part and of nearly equal height.

DRILLS FIFTY HOLES AT ONCE AT THREE ANGLES

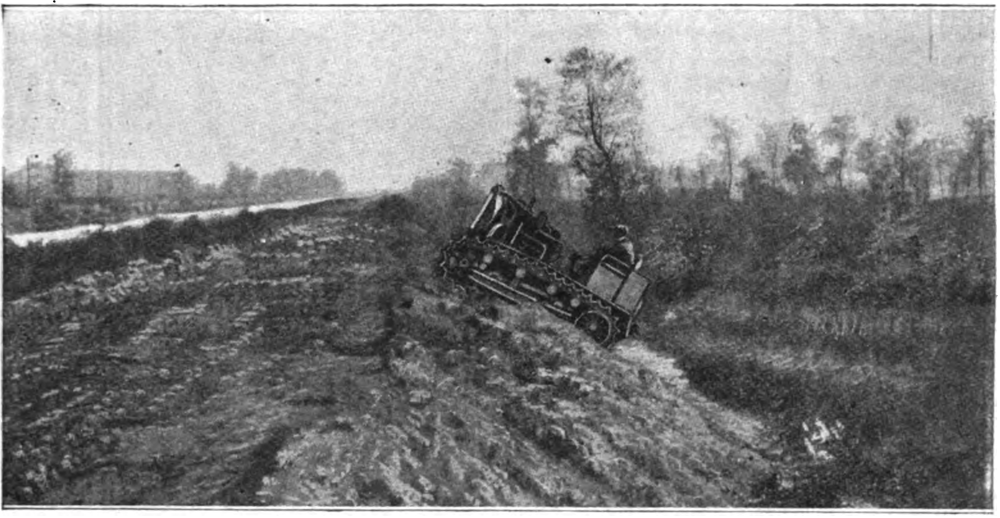
A multiple-spindle drilling machine, cutting 50 holes at a time from three directions, is used in drilling cast-iron bodies for gas meters. The machine drills at high speed 36 holes horizontally, from opposite directions, and 14 vertically from above. This application illustrates the versatility and flexibility of the properly designed gang drill, whose limit of multiple performance probably has not yet been reached. Drilling all the holes in a part at one operation is now common practice.



Multiple High-Speed Drill Bores 50 Holes in One Operation from Three Sides. This Super-Gang Drill is Used on Cast-Iron Gas-Meter Bodies

LEAKAGE FROM PIPE LINES WASTES NATURAL GAS

Poor construction of pipe lines is the cause assigned for the loss in one year of natural gas valued at $9,000,000, in two states alone. Fuel-administration figures for a group of Kansas and Missouri cities and towns show a waste of 27 to 73 per cent of the gas delivered to the city gates. From September 1917 to August 1918, a total of 9,557,143,000 cu. ft. of gas was delivered, and only 5,679,256,000 reported as sold, a discrepancy of 3,877,887,000 cu. ft., or 40.58 per cent. While the wholesale companies and the distributing companies, which buy from them on a percentage basis, blame each other for the waste, checking of all wholesale meters in the district by the Bureau of Standards is relied upon to locate the responsibility and lead to elimination of the big loss.



This Five-Ton Artillery Tractor has Emerged from the Swamp and is Ascending a 100-Per-Cent Grade to the Road, Merely as a Test

SWAMPS, BUMPS, AND GRADES USED IN TRACTOR TEST

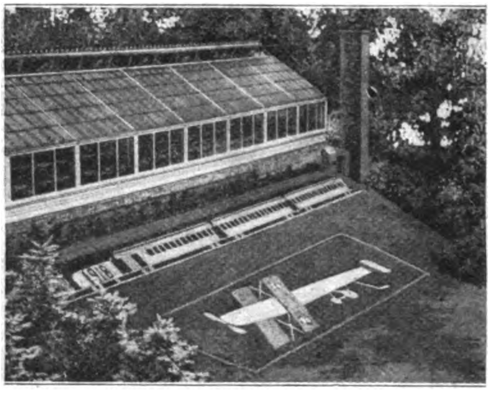
Running over a stretch of rugged ground called by courtesy a road, down a 100-per-cent declivity, across a swamp, and up an equally stiff grade on the other side, is a sample of the tests to which military tractors were subjected before delivery. A manufacturer of five-ton artillery tractors put every new machine over this route. Sometimes a tractor was tipped over by tackling the grades at too oblique an angle, and had to be pulled right side up by another machine, usually in undamaged condition. Severe as the test seems, conditions of military use certainly were no easier.

SALE OF ICELANDER'S VESSEL ENDS PLANS FOR SHIP LINE

An unexpected turn of events prevented the establishment of the Iceland-American steamship line proposed some time ago. It will be recalled that a voyage from Iceland direct to New York was made by an Icelandic vessel, and that there was much popular interest in the event because it was said to have been the first ship to make this trip since the days of the Norsemen. At the time the boat arrived, ships of all sorts were at a premium, and while here the captain and owner received such a flattering offer for his craft that he abandoned his former plans and sold out. It is said that his profits exceeded what he could have made in many trips.

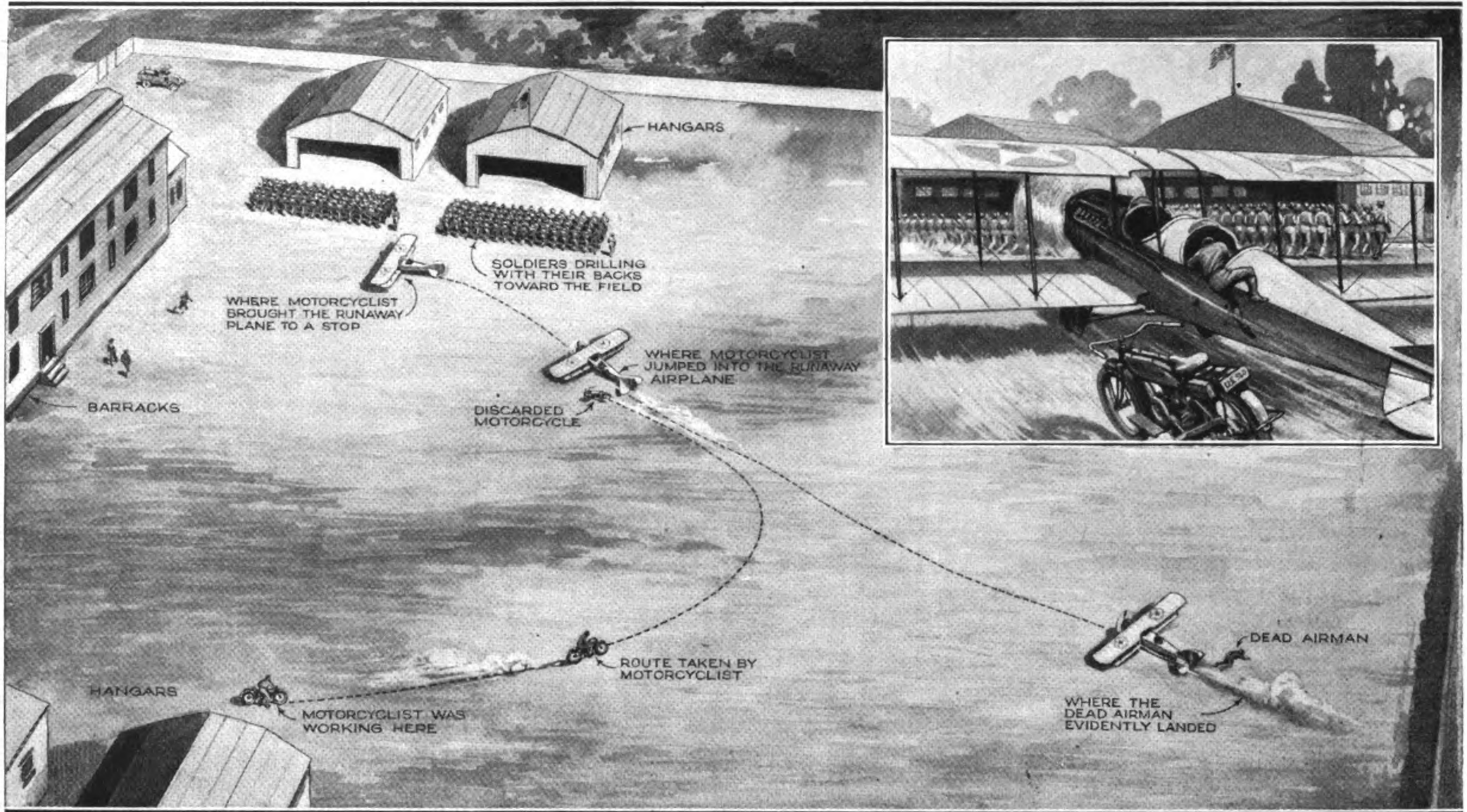
AEROPLANE REPRODUCED IN FLOWER BED

A florist and landscape artist has attracted considerable attention to his establishment by reproducing the design of an aeroplane in a flower bed on the slope adjoining his greenhouse. The figure is 18 ft. long and 6 ft. wide, and several hundred plants of various colors have entered into its composition. Surrounding it is a background of darker hue. Another bed represents a passenger train.



Novelties in Designs for Formal Flower Beds: The Representation of the Aeroplane Measures 18 Feet Long and 6 Feet Wide

¶The United States Naval School of Turbine Engineering has been established at Carnegie Institute, Pittsburgh, and is now training men in anticipation of the needs of our merchant marine.


HANGARS
SOLDIERS DRILLING WITH THEIR BACKS TOWARD THE FIELD
WHERE MOTORCYCLIST BROUGHT THE RUNAWAY PLANE TO A STOP
WHERE MOTORCYCLIST JUMPED INTO THE RUNAWAY AIRPLANE
BARRACKS
DISCARDED MOTORCYCLE
DEAD AIRMAN
ROUTE TAKEN BY MOTORCYCLIST
HANGARS
MOTORCYCLIST WAS WORKING HERE
WHERE THE DEAD AIRMAN EVIDENTLY LANDED

This View Indicates the Path of the Runaway Airplane, the Position of the Daring Dispatch Rider Who was Cleaning His Motorcycle near the Hangar in the Left Foreground, and the Company of Soldiers Drilling at the Opposite Side of the Field. The Dead Airman, Who was Found with His Head Crushed, as Indicated in the Right Foreground, Evidently had been Struck by the Propeller as He Started His Engine. The Insert in the Upper Right Corner Illustrates the Desperate **Leap of the Motorcyclist** into the Fuselage of the Runaway Plane, Whose Mile-a-Minute **Speed He Checked Just** in Time **to Save the Soldiers**

MOTORCYCLIST'S DARING LEAP SAVES MANY LIVES

A dispatch rider's daring leap from a motorcycle into the fuselage of a runaway airplane going 60 miles an hour averted, by a few feet, an appalling disaster at a Pacific-coast flying field. The motorcyclist was cleaning his machine near the hangars when the riderless plane flashed by. It was headed straight toward a company of soldiers drilling with their backs toward the onrushing destruction. Jumping into his saddle and throwing on the last ounce of energy, the dispatch rider succeeded in swinging in behind the plunging, bounding plane, and leaped for a hold. The desperate chance won. Drawing himself up and into the fuselage he brought the runaway plane to a stop not 50 ft. from the backs of the drilling men, through whose ranks it would have torn to its own destruction beyond. The missing pilot of the derelict plane was found on the field with his head crushed, evidently by a blow from the propeller as he started his engine.

HOW SAILORS LEARNED TO "SPOT" U-BOATS ON DRY LAND

By LLOYD SEAMAN

BRITISH seamen are never done marveling at the marksmanship of the American sailors who manned the guns of the merchant ships and the destroyers on the Atlantic Ocean in the submarine war. Their record is indeed remarkable, for Yankee jack tars, green to the sea and new to their guns, did, in their first months at the new game of spotting U-boats, show accuracy that broke all precedents.

That the back of the submarine offensive was broken so soon after America got into the war full swing, is due to the fact that the United States Navy, in its vast training stations on land, instructed its recruits fully and expertly, in this most difficult and the newest of all gunnery problems—the hitting of bobbing, fleeting, diving conning towers.

No precedents were there for this task. Submarine warfare was new. England had learned the science of catching the range of the will-of-the-wisp periscopes only by hard experience, by training its men in actual practice.

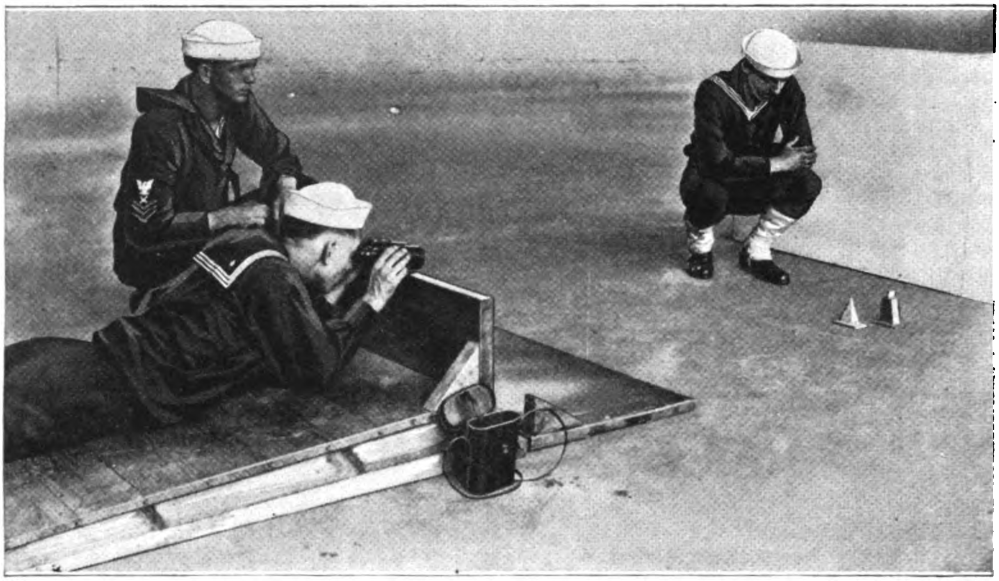
America could not do this. It had to train its men far inland, and at all events on terra firma.

But it mastered the science by inventing a "submarine game," a miniature range which could be put up on any level floor and used to give the new men adequate and realistic education in shooting periscopes, "shooting" with a pair of binoculars!

The game was played in this way: Upon a low platform the sailor lay prone, resting his glasses on a board upended before him. Ahead stretched the range, and at its other extreme, stood a large painted canvas colored in imitation of the sky. The sailor lying upon the platform and peering through glasses which he held, got approximately the same angular view that a sailor had on a 40-foot bridge at sea. The range in every particular is laid out an inch of imitation to a yard of reality. That is, the range being 2,300 in. long represents 2,300 yd. at sea—close to the greatest distance at which a submarine could be sighted. At the platform where the sailor studied the play range this same scale was carried out, the top of the board, upon which the sailor rested his glasses, being 13 to 14 in. from the floor level. This of course was relatively like the 13 to 14 yd. at which a ship's bridge rears above the water level. Midway between "bridge" and "sky" is a faint chalk mark which, unseen by the peering sailor, runs to the "sky." On either side of it run other lines, parallel each with the other and 2 in. apart. At every 50 inches another chalk line crosses them at right angles, making this half of the range scientifically crosshatched. These right-angle lines are charted at certain distances from the "bridge."

Beside the prone sailor kneels a master at arms, and somewhere down the range stands an instructor who aids this official.

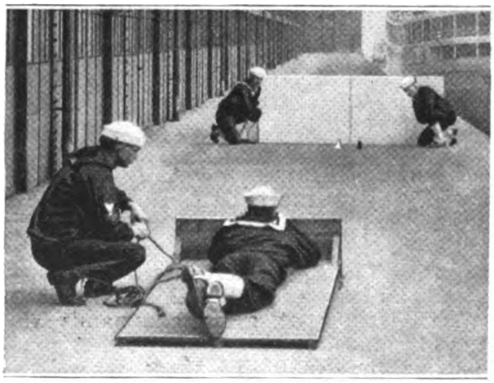
The master at arms commands the pupil to focus his glasses on the "horizon." This is the black line made where the canvas frame rests on the floor. When this has been done the master at arms raises a wooden flap before the pupil's glasses, shutting off his view of the range and at the same time signaling to the instructor to set up the target at a certain range. The instructor places a small



The Range is Laid Out on the Scale of an Inch to the Yard. The Pupil, Using Binoculars, is Given Two Seconds in Which to Determine the Position of the Imitation Conning Tower, in Front of Which, in the Above Picture, is Shown the White Pyramid That Serves as the "Splash"

wooden replica of a submarine conning tower on some one of the parallel lines, noting how far to the right or left of the center line it is and, by the nearest cross line how many inches it is from the "bridge."

Then the master at arms drops the wooden flap, revealing for two seconds the range to the pupil before shutting off his sight again. In that time the student must determine how far away the conning tower is, its "range," in other words, and also how far to the right or left of the center line, or as they term it, the object's "deflection."



The Floor of the Range is Accurately Plotted with Chalk Lines, Making the Exact Position of the Target Apparent to the Instructors

The student calls out as though to a gunner waiting, shell in breech, lanyard ready on the deck below: "Submarine sighted. Nineteen hundred and fifty. . . . Forty-eight."

Translated this means that he guesses the conning tower is 1,950 yd. away and two points to the left of the center line. This center line is represented on gun range finders as "50," points to the left descending in order, such as one point, "forty-nine"; two points, "forty-eight"; three points, "forty-seven," and so on, while points to the right ascend, "fifty-one," "fifty-two."

In actual battle a gunner receiving this order would turn his calibrated measuring mechanism so that the shell would hit the water at a point 1,950 yd. away and two points to the left.

In the "game" the instructor down the range places on this point of the floor, a small white pyramid, called the "splash," since it represents very satisfactorily the column of water thrown up by a shell.

The chances are the "splash" is short or "over" the conning tower, and the student is given another chance, and is trained until he learns to get both distance and deflection correctly.

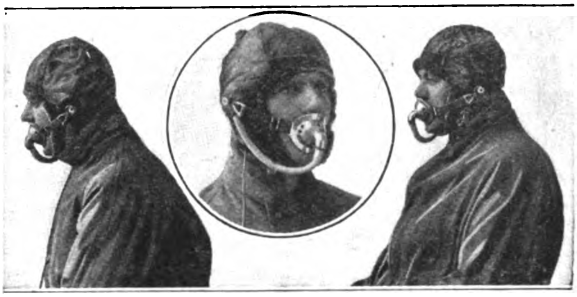
¶ It is now stated on good authority that during the war parrots were placed in the Eiffel Tower because they gave warning, by their actions, of the approach of enemy aeroplanes.

THREE-TERM SCHOOL YEAR DISPLACES TWO TERMS

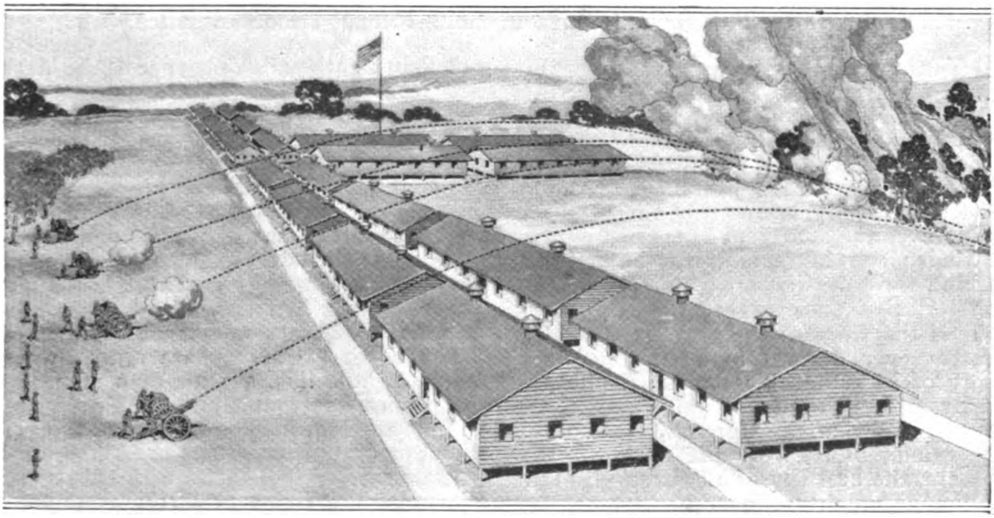
The school authorities of Minneapolis, following the example set by several higher institutions of learning, have adopted the three-term plan for grade and high schools to take the place of the two-term system commonly in vogue. An advantage of the new arrangement is that it permits promotions three times a year and more frequent reclassification of pupils. Each term now has 13 weeks and the vacation period is of the same length. Eventually the summer-school work may be merged into the regular courses so that, if a pupil desires, he or she can attend school the year round, doing four years' work in three. Such a plan, it is believed, would result in more pupils finishing their courses.

PHONE APPARATUS FOR AIRMEN IS OF MARKED SIMPLICITY

Now that the Hun is in restraint, attention may be called to a simple telephonic apparatus, developed for airmen, to enable pilot and observer, or passenger, to communicate freely with each other while aloft. The roar of an airplane motor, it will be recalled, is so great as to prohibit conversation by ordinary means. A sensitive receiver and a dictograph transmitter are incorporated in a helmet. Held firmly in place before the wearer's lips by elastic straps is the mouthpiece of a speaking tube. The latter conveys the voice sound vibration to the transmitting instrument, while cutting out and eliminating to a large degree the motor noises. The two helmets are connected by wires. Each of the helmets is provided with a flexible cord which plugs into a receptacle in the fuselage. The apparatus is very simple. It does away with the breastplate transmitter. Arrangements also have been made to attach to the mouthpiece the oxygen apparatus used for high-altitude flying.

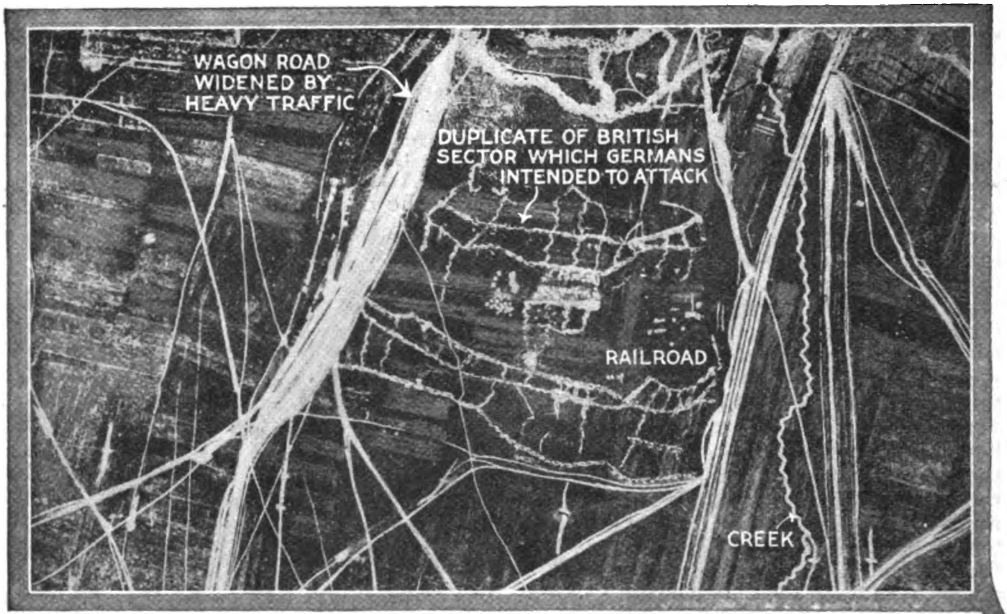


Aeroplane Observer and Pilot Equipped with Telephone Outfit Which Enables Them to Converse Despite the Noise of the Motor: Insert Shows Front View of the Transmitter



FOREST FIRE EXTINGUISHED WITH ARTILLERY BARRAGE

THIS western army camp was in serious danger of destruction by fire, which was charging down upon it from the blazing brush and forest beyond, when reinforcements arrived in the shape of a company of field artillery. The guns quickly laid down a barrage of shells that utterly annihilated the enemy. The soldiers of the camp had used all their fire-fighting equipment in vain when the happy thought occurred to bombard the conflagration. Within five minutes after the first gun was fired the flames were extinguished, smothered by the flying earth, and scattered in dying and harmless fragments.


WAGON ROAD WIDENED BY HEAVY TRAFFIC
DUPLICATE OF BRITISH SECTOR WHICH GERMANS INTENDED TO ATTACK
RAILROAD
CREEK

This Photograph Won the Allies an Important Victory. The Trench System in the Middle was Built by the Germans for Rehearsing an Attack on a British Sector in Flanders, of Which It Was an Exact Duplicate. The Widened Wagon Road Indicated Large Troop Movements, and a Telegram to the Commander of the British Sector Gave Him Advance Information Which Resulted in a Bloody Repulse of the Attack

THE EYE BEHIND THE LINES

How Pictures were Used to Win Battles Demonstrated for the First Time

By DOUGLASS REID

Part I—The Spy of Spies in Long-Range Reconnaissance

BY the eternal fitness of things Sir Arthur Conan Doyle should write this story, for in the spellbound hours in which laconic brown men in khaki and "horizon blue" gave it to me, I visualized no one so much as Sherlock Holmes, grim, brooding and penetrating, riding in their places miles over the smoke of Flanders; sitting in their places in the map-littered dugouts behind the lines of battle, untangling the mysteries of uncanny secrets.

It is the story of the greatest detective system ever devised by man, the inner story of how the allies by aerial photography and weird deduction from meaningless prints of the German lines solved the riddles of the foe—the story of "the camera, the best spy of all time."

For, as much as any other factor, the camera won the war. Time and again the allies, in those terrible days of suspense before America flashed to the rescue, only met and stopped Hun drives because the camera had told them where and when to prepare. And in the brief year of America's fighting, the all-seeing eye of the black box from our planes did its share in ripping the veil of secrecy off German plots of battle. Into this story will come the strange case of the human footprint and the countless things of stealth it revealed. also the curious "rogues' gallery" of German generals which the allied detectives collected, kept, and used with such sure might—also the odd . . . but a beginning must be made.

In the first place one must understand that the general in warfare must always see the whole line, see his own men, see the enemy, see everything. Cæsar stood on hills and saw his handfuls fighting over a valley. Napoleon always ordered a high scaffolding erected to view his battles; Frederick the Great preferred windmills. Foch sat in a cellar, 30 feet underground, and saw a thousand times more than Napoleon on his turret; saw infinitely more of that line from the Alps clear to the sea than the Corsican saw of the scant 10 miles of his battle lines.

This was because Foch had the camera, while Napoleon had a spyglass. Modern photographic science laid before each allied general a complete picture of everything the enemy was doing and almost everything it was going to do. It showed him unmistakably what his own men were doing and what they could do. It relieved him of conflicting stories from spies, from human mistakes—for the camera does not lie.

Napoleon could but guess what Wellington was planning; Foch could send up a photographer and within an hour know what Ludendorff was thinking of.

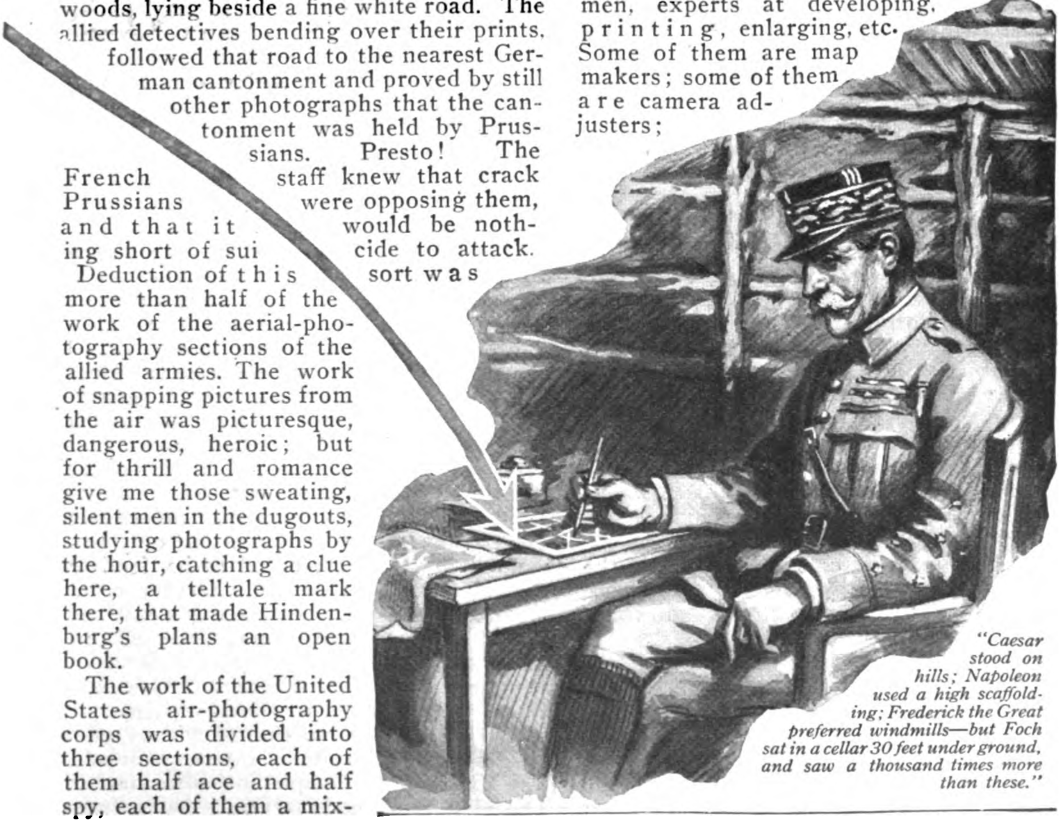
Consider this: Once the French were planning to take a certain hill, knowing that Bavarian "Landsturm"—poor machine-gun fighters—held it weakly. At dawn a photographer went up, came dashing back with a picture, and 15 minutes later the French general called off the attack and saved the lives of thousands of his men. And yet the camera had caught no remarkable thing. It merely showed that one group of men had gone out and another come into the trenches during the night. The footprints of the Germans told that much. The incoming trail, followed back, was found to emerge from a woods, lying beside a fine white road. The allied detectives bending over their prints, followed that road to the nearest German cantonment and proved by still other photographs that the cantonment was held by Prussians. Presto! The French staff knew that crack Prussians were opposing them, and that it would be nothing short of suicide to attack. Deduction of this sort was more than half of the work of the aerial-photography sections of the allied armies. The work of snapping pictures from the air was picturesque, dangerous, heroic; but for thrill and romance give me those sweating, silent men in the dugouts, studying photographs by the hour, catching a clue here, a telltale mark there, that made Hindenburg's plans an open book.

The work of the United States air-photography corps was divided into three sections, each of them half ace and half spy, each of them a mixture of reckless daredevils and cold master minds.

The first was long-range reconnaissance, performed by the United States Division of Aerial Photography; the second, trench photography, and the third, battery photography, both performed by the United States Army Section of Photography. The men who did the work in the second and third branches were merely attached to a certain sector to be of immediate help in solving the doughboys' perplexities. Fighting men might be moved in or relieved, but the photo section remained always at the same sector, thus becoming perfectly familiar with every hill and dale.

Sherlock Holmes would have been in long-range reconnaissance! For here the powers of human deduction were put to their greatest test. Everything that the enemy was doing, miles and miles behind his lines; all that he was getting ready to do, must be photographed and translated.

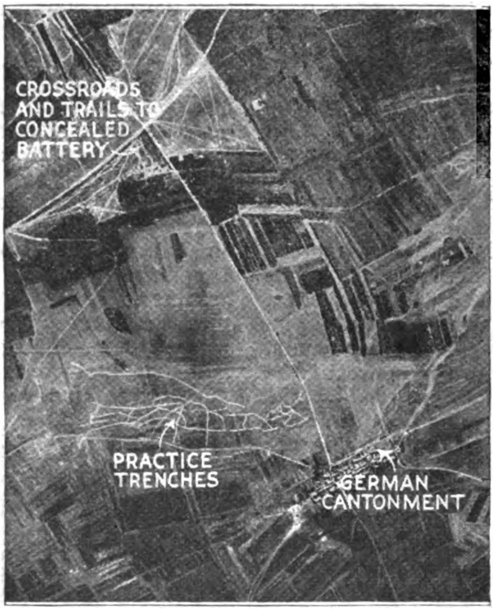
A photo section in the American army—and the French and British organizations, in the main, paralleled our formations—consisted of 30 men under a first lieutenant and was assigned to do sleuthing over a certain territory far within the Hun holdings. Some 15 of them are dark-room men, experts at developing, printing, enlarging, etc. Some of them are map makers; some of them are camera adjusters;



"Caesar stood on hills; Napoleon used a high scaffolding; Frederick the Great preferred windmills—but Foch sat in a cellar 30 feet under ground, and saw a thousand times more than these."

some are lantern-slide authorities, and some are file clerks. Two of them are motorcycle riders, who hurry the prints to the staff officers. The first lieutenant, his first sergeant, and such other men as qualify, are photographers, riding with the airmen who are assigned to take them where they want to go.

The camera here is the spy behind the lines, a furtive thing hanging stealthily on the clouds, miles high; slipping here and there over the enemy unseen, yet seeing all. Contrary to the general belief, it is now known that the long-range reconnaissance men were usually unprotected on their trips.



A German Cantonment behind the Lines in the Verdun Sector: The Numerous Trails near the Intersection of the Roads Led the Allies to Suspect the Presence of a Big-Gun Battery in a Wooded Hill Near By, and Later It was Definitely Located and Destroyed. Here Also were Found Practice Trenches Indicating a Contemplated Attack on a French Position 10 Miles Away

The photographer is driven aloft in a slow plane, one that an enemy combat plane can easily overtake, since the latter holds but one man and no camera. Anyway, he goes up. He may be assigned to take map pictures, or he may be told to take special views of a certain suspicious spot. He works with a map camera in the first instance, a standard aerial camera in the latter, or in exceptional cases he may use a special "gun" with long focus to bring out a strip of ground with extra clearness. He rarely or never takes pictures below three and one-half miles. His task is not hard, according to himself. He is told his objective when he ascends; his camera is set to be "shot" at a certain altitude, at a certain plane speed, and his shutter is corrected to meet the atmospheric conditions. Science makes his task largely a formula to be followed—all he does is risk his life.

Every foot of German ground assigned to him he photographs, not once but a thousand times, covering it painstakingly, then doing it all again. His pictures the photographic officer studies with a microscope, hunting clues. He sees where the enemy headquarters are, where their big guns are, where they are building railroads, gun emplacements, where their signal stations are, and in more cases than one can believe, what they are thinking!

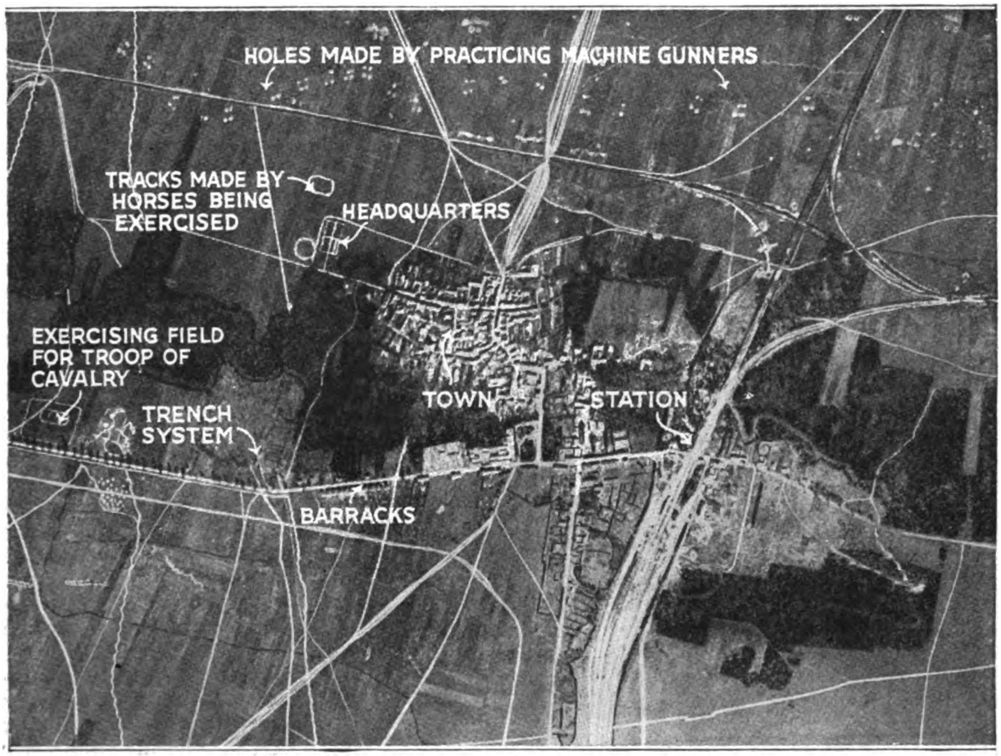
He picks out objects for his own bombers and for his own big guns. He sees where all the Hun generals are, and where they will strike next. He is the detective who gets to know all of his criminals' habits.

He can take a flat, uninteresting picture of a landscape, discover a German cantonment, a general's headquarters, and before he is done with it, tell that general's name, how many men he has under him, where they will attack next, how soon, and just what sort of an attack the allies may expect.

Footprints tell him most of this, for there is no more astonishing thing in the whole marvel of aerial photography than the camera's ability to catch the trail of a walking man. At two and a half miles in the air the ordinary aerial camera will show the footprints of a man going across slightly shelled ground. At a mile it will show them on new-mown grass. At five miles it will reveal them trailing across "No Man's Land."

The following may be taken as a normal instance:

In a picture of a village, 15 miles behind the lines, the photographic officer notes buildings that instantly betray themselves as barracks. Definite trails, that only soldiers living in them could make, lead to them. Near by is a villa, farther on a town. He sees that the place is a railroad center and a division point. The villa he scans closely. Hard by it is a faint irregular circle on the grass. This was made, he reasons, by horses being led about by orderlies so that they may cool off gradually while their riders are inside. The riders have come for information. The villa is a headquarters. Aside from


HOLES MADE BY PRACTICING MACHINE GUNNERS
TRACKS MADE BY HORSES BEING EXERCISED
HEADQUARTERS
EXERCISING FIELD FOR TROOP OF CAVALRY
TRENCH SYSTEM
TOWN
STATION
BARRACKS

One of the Most Important Photographs Taken in the Whole War: The Various Markings Mean Little or Nothing to the Untrained Eye, but the Staff Officers, by a Truly Marvelous Process of Deduction Established the Fact That Here Was the Headquarters of a German Major General, in Command of 10,000 Men, with a Certain Number of Machine Guns and a Troop of Lancers, with Which He was Preparing an Attack on a French Position, 30 Miles Away, to Take Place in About Three Weeks

machine-gun officers, majors are the lowest officers of foot soldiers that are mounted. Hence the man to whom majors come for orders must be a colonel or better.

Now, behind the villa, the detective spies a larger and more regular circle on the grass. This, he deducts, is made by orderlies exercising horses daily according to routine. The officer of the villa has a private stable of horses for himself and staff. Now he knows an all-important fact: the German is either a brigadier or major general.

Next he discovers practice trenches and machine-gun pits on the outskirts of the town: an infantry organization. Then he finds still another circle made by horses, a circle just large enough for one troop of cavalry to use in practicing.

This tells him that the officer in the villa is a major general, since no brigadier general in the Hun army boasts a troop of cavalry.

He scans this last circle more closely. Its shape informs him that the troop is composed of lancers rather than saber men, since it is round, whereas the circles of saber men riding in practice are in the shape of a figure "8." Lancers drill, thrusting from the right-hand side only, while saber men practice striking to both right and left, their horses being trained to step so that weight of both man and beast will be thrown into the blow, thus weaving in and out in a figure eight.

Discovering this, the detective turns over in his mind the names and organizations of the various German major generals. Only one has a troop of lancers attached: Major General von A.

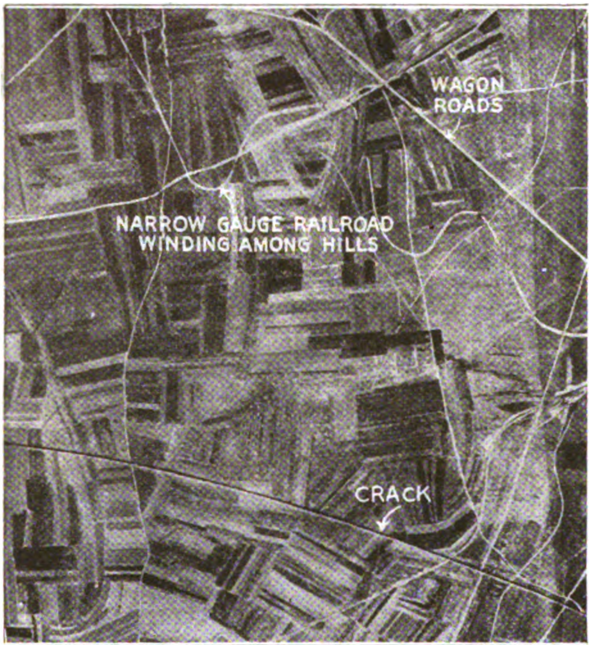
This, then, is he.

What is he planning?

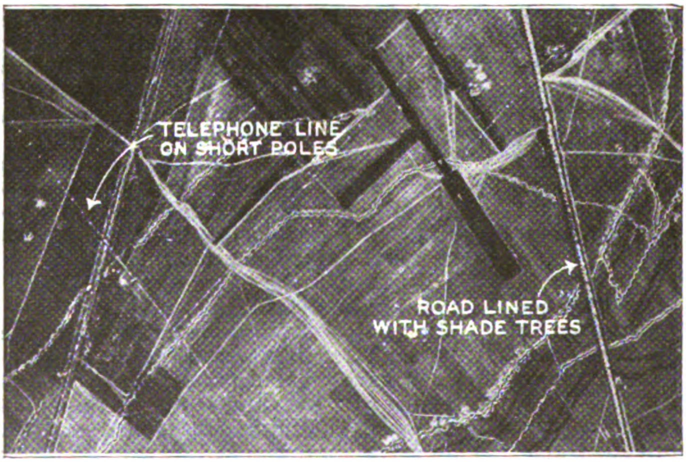
The photographic officer bends over the system of trenches which the Hun infantrymen have created for practice. This is a replica of some little sector of the allied lines which the Huns are going to attack. They have photographed it, worked it out carefully, and duplicated it exactly, in order that their men in the hour of attack may be perfectly familiar with their objective.

Our detective calls for a map of the

allied lines within a radius of 50 miles. Experience has told him that the Germans will not be planning to attack farther away than that. He goes over this map carefully, and finally finds a plan of trenches in such and such a sector of the French lines, 30 miles south, let us say, that he is safe in concluding is the particular sector the Huns are going to attack.



The Narrow-Gauge Railroad Winding among the Hills was Recently Laid, as Revealed by Its Whiteness. By Following It to Its Junction with a Standard Road, an Ammunition Depot was Located and a Point Identified Where a New Offensive could be Expected. The Plate was Cracked When Dropped from the Observer's Plane in a Parachute



The Allies First Mistook the Tree-Lined Roadway for Marching or Standing German Troops, and, after Shelling Them All Day Long, Marveled at Their Discipline, Until the True Nature of the Mark on the Plate was Reasoned Out. The Telephone Line, However, Furnished No Puzzle, for the Circles around the Posts Indicated the Path of the Watchman Patrolling It

Again he bends over the picture. The Huns have not completed their work. He knows that they will practice two weeks after their completion and then occupy a day and a night transferring to the place of battle. So with a final scrutiny of the number of machine-gun practice pits he writes out a report to the army commanding officer informing him that Major General von A. with so many thousand infantrymen will attack such and such a sector on such and such a day, employing a certain number of machine gunners, and that in the meantime bombers can find Major General von A. at this certain spot. This report is positive—the aerial detective can be relied upon.

The following day the photographic officer sends another camera man to hover over Major General von A. and make another picture, and each day thereafter the same thing, so that when at last the German officer leads his men to the objective, not only is he met and defeated, but his entire record is hanging on the wall where it may be used as a key to his way of preparing, his habits, and his weaknesses, against the next time he sallies forth.

Allied photographers collected during the war an enormous amount of information on Hun division commanders, cataloguing their methods of fighting, and filing away absolute proof of how they chose to fight, just what their pet theories were, and how they sent their men into the fray.

A veritable rogue's gallery.

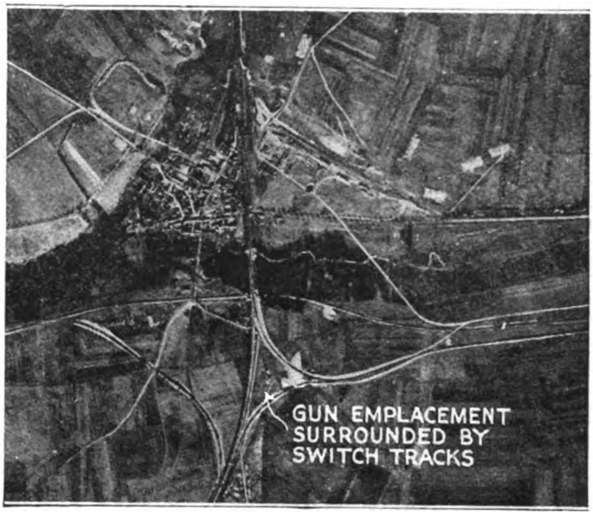
Another instance: General von B. is located near Château-Thierry, let us say. The photographers know from other days that he commands Bavarians. They produce pictures which prove Bavarians are preparing to attack at Château-Thierry. How do they know this? Their practice trenches are duplicates of the French lines at this point.

But how do the pictures tell the Germans are Bavarians?

Absurdly easy, if you have a deductive mind.

In the cantonment are seen a large number of winding paths. Here goes a skein of them made by soldiers cutting across lots to the back door of their barracks at night. Here go a dozen more shooting across to the canteen. All over the field are evidences of men making their way the shortest way, disobeying orders, since German commanders insist that their men keep to the beaten paths for the very reason that the allied photographers learn much by following vagrant trails.

Now these signs of carelessness are sure proof that the men are not Prussians, for the Prussian guardsmen obey orders, are better soldiers. The men are from south Germany, where the people are pleasure-loving, and they have been loafing about the canteens with the garrulous sociability of their race, slipping back late at night to their barracks by the forbidden but quickest, shortest way. They probably evaded their own good-humored sentinels, leaving trails unnoticed from the ground, but betraying everything to the allies, on whose photographs their footprints showed like rabbit tracks in the snow.

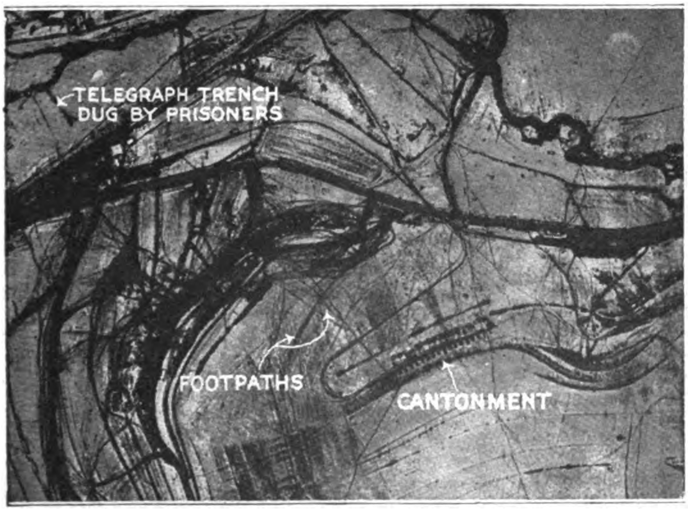


In This Picture the Photographer Caught a Newly Laid Emplacement for a Large Gun. The Germans Built U or Y-Shaped Switches around the Big Pieces in Order to Enable Them to be Fired in Any Direction, if Placed on a Railroad Car, or to Bring Up the Heavy Shells on Crane Trucks to a Stationary Gun. The Camera Told, Also, the Kind of the Latter, for the Emplacements of Naval and Land Guns Were of Different Shapes

Allied photographers laid the whole German railway and telegraph system open to bombers and discovered clues whereby military plans were anticipated months ahead.

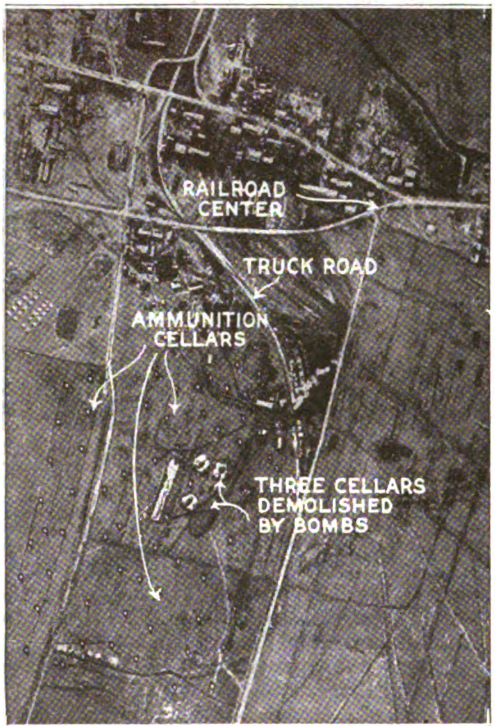
For the first months of the war—and here it may be said that military men at the beginning of the conflict scouted the whole efficiency of aerial photography, and the first pictures were made with ordinary cameras — the photographers were puzzled by queer curving lines in their prints, lazy, looping lines that bent seemingly without rhyme or reason. Finally they saw that they always formed a juncture with a standard railway sooner or later. They might be smaller railways they reasoned, but why the unnecessary curves?

Then, by deduction,



A German Cantonment Photographed in Winter: Because of the Presence of Snow, the Camera Shows Up the Various Footpaths and Trails with Astounding Clearness, but the Maze of Tracks Also Tells Something More Important, Namely, That the Barracks Housed Easy-Going Bavarian, or Other South-German, Troops, for the Strictly Disciplined Prussians would Not Dare to Use Any But Prescribed Roads. Note, Also, the Prisoner-Dug Telegraph Trench in the Upper Left Corner

they perceived that the bends were caused by hills that were made invisible when looked at from above. The Huns could not take time to make grades and cuts for these temporary roads, and therefore followed the terrain, whereas their main lines were put through on the level, cutting and filling as required. Later on in the war, the Germans sought to confuse the allied cameras by making these narrow-gauge roads appear as wide as trunk lines, digging up the dirt on either side to give the line the broad aspect of the important road, but it was wasted efficiency, for the photographers could note the abrupt turns that would derail a standard coach, and when the road crossed an exposed table-land, where it would be unsafe to send the puffing "dinky" engine, the white trails of the draft mules showed plainly between the rails.



A Big German Ammunition Depot, Consisting of a Large Number of Concrete Cellars, Spaced Widely Apart to Prevent Complete Destruction of the Depot if One is Blown Up: The Photograph was Taken After Three of Them had been Destroyed in a Raid

The distinction between these roads was important because wherever a narrow gauge joined a standard gauge, there, nine times out of ten, was an ammunition depot, where allied bombers at night could work havoc. A new narrow-gauge road meant the moving of men and ammunition at no distant date, to some point of activity. Whenever the allies found these they let the Germans finish their construction work, watching the progress steadily; and in time, noting where the road had its terminus in the Hun trenches, warned their own infantry to expect an attack at this point.

Photographs disclosed the location of every big railroad gun the Germans used. A Y or a U-split in the tracks revealed each of them. A "Y" meant a big gun, for it gave the cannon, mounted on a railway car, the opportunity to move about and point at any possible sector. A "U" meant a big gun, because behind many of the giant cannon, switches in the shape of this letter had to be laid for the carrying of the heavy shells up to the gun's breech on a massive crane. When the Germans made emplacements for their great stationary guns, the camera caught that too and told whether the cannon was a naval or a land piece, for the former had round and the latter crescent-shaped emplacements.

The task of spotting telegraph wires was more difficult, for the Huns, soon learning that the allies had located their ordinary overhead-wire system like that used along American railways, took to burying all their wires, since the enemy bombers took special delight in messing up their poles and wires at frequent and distressing intervals. They produced digging machines which cut a narrow trench through the earth, and they made time by setting batches of prisoners to work with shovel and spade. But the camera not only caught both, but distinguished between them; a valuable thing, since the prisoner-laid wires were not nearly so deep—the prisoners of course being lazy—and could be reached better by bombs.

The distinction was made by this fact: The prisoners threw dirt out of the trench first on one side and then on another, one squad throwing one way, another squad the other, while the machine cast out all the dirt on both sides of the ditch. This showed plainly on the prints.

After the bombers had foiled the German cleverness here, the Huns bethought them of a new scheme. They would go back to aerial wires, but use smaller iron posts that would not make the telltale dots, and they would string fewer wires in order that nothing might be visible. They worked this out, smoothing all dirt away from the post holes, but the allies a day or so later roared with laughter. The system was as plain as ever. For this reason: The German signal corps kept a man always patrolling the wires, watching them, mending them constantly. And his footprints betrayed everything, for they were not in the ordinary straight line made by a man walking a beat. At every post they turned out, went around, and then turned back into the path again. Wherever there was a post, therefore, was a big circle.

A more difficult feat was the detection of marching men on the clear white roads of France. In the early stages of the war it was common for a print to disclose dark ranks of marching or standing men all along the causeways. Immediately the photographers informed their batteries, and the big guns began shelling the troops violently. A plane would go up, shoot a picture of the effects, and return. Gaps would be torn in the ranks, but the men would be still in formation. "Marvelous discipline," the allied commanders would say staring at the picture; "what splendid obedience; poor fellows!" and would go back to pounding them some more.

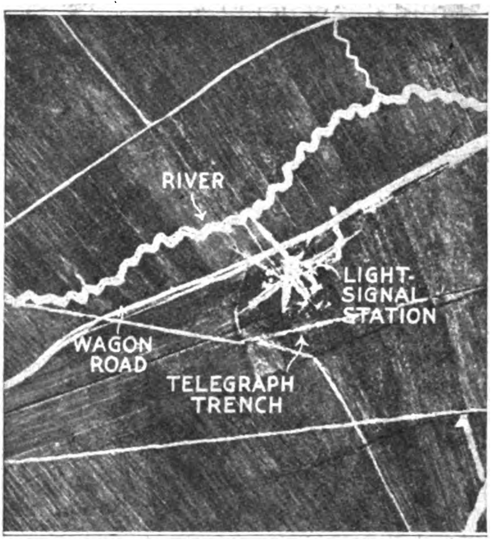
Photographs coming in would show little or no progress in routing these bands. Sometimes the black lines could be seen re-formed over the actual shell holes.

Then the detectives took time to think, and discovered that the black ranks were not men at all but the shadows of the poplar trees that flank the roads in Picardy and Flanders!

Later on they could tell at a glance where the road was full of shade or men, because the shade would run unbroken across the road from the side from which the sunlight came, while no ranks of men would quite stretch entirely across the road on both sides.

Daily photographs of the roads far behind the enemy lines told much of his intent, for the moment a big movement of troops or trucks got under way it was impossible to keep traffic on the path, and men and cars, turning out and in, made parallel paths, widened and whitened the way to such an extent that, on the picture, it immediately became a glaring ribbon or hank of thread, unmistakably transparent.

In revealing light-signal stations, too, the camera accomplished wonders, for it was by these carefully buried centers of information that the Germans thought to convey secret information to distant points when telegraph systems were crippled and dispatch bearers too slow. Digging deep into a hill they buried a powerful acetylene light, and in lines radiating from it, dug trenches down which the light could flash and flare directly at some far-distant station and be seen by no one unless he happened into the narrow path where it played. But these showed up glaringly on the prints and offered easy targets for bombers.

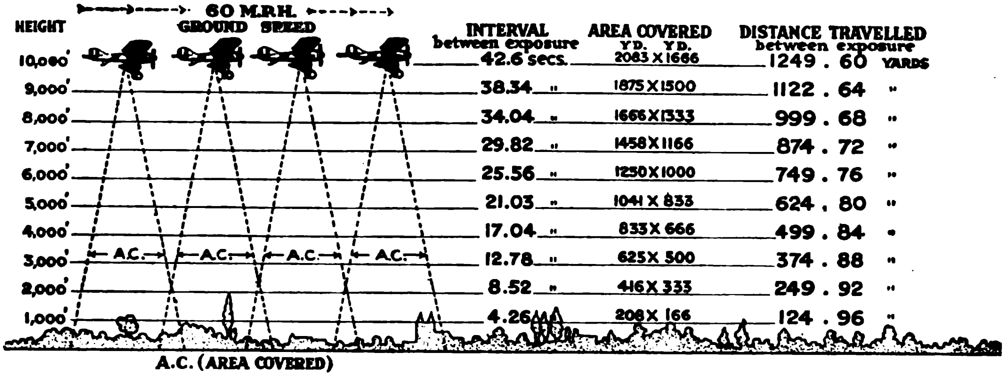


Acetylene Lights for Signaling Purposes were Placed Deep in a Hill. The Germans Thought This Scheme would Prevent Discovery, but the Camera Betrayed the Stations. That the Telegraph Trench was Dug by Prisoners is Proved by Its Irregular Edges, the Prisoners Throwing the Dirt Alternately to One and the Other Side

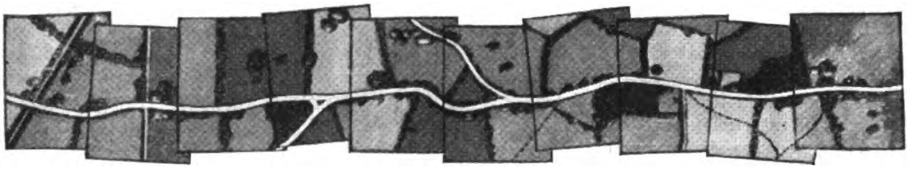
It was in map making, however, that the purely scientific end of aerial photography had its innings. A special camera for this department of the work was invented, an automatic film affair—all others used plates—that could be operated by a pilot flying alone.

Both French and British claim to have developed this camera, and the truth, as nearly as one can discover, is that both, working under the same necessity, brought it to light at about the same time. The American forces used the French "Automatique, F.24," to best effect. The thousands of aerial photographers who trained in the United States, and who never "got over," swear by it, having "shot up" miles of innocent Yankee farm land with it.

It was invented because the allies found it impossible to take enough pictures on long-range reconnaissance in the time given them by "Old Sol." Hundreds of square miles had to be studied, and the fastest men could only take a fraction of the territory assigned to them. For the first two years of the war, they were forced to work with the "changer" gun, the best they had at the time. This held from 18 to 24 plates, which could be changed by the mere touching of a plunger. Then came another camera, now simply known as the L-type. It was automatic, the transfer of plates inside the camera being accomplished by a plunger, as in its predecessor, except that no human hand was needed to touch it every time the transfer was to be made. A worm screw holding it in the camera projected out to the front of the box, where it was attached to a tiny propeller, which, whirling in the wind of the airplane's speed, operated the screw and consequently the plunger.



HEIGHT	INTERVAL between exposure	AREA COVERED YD. YD.	DISTANCE TRAVELLED between exposure
10,000'	42.6 secs.	2083 X 1666	1249 . 60 YARDS
9,000'	38.34 "	1875 X 1500	1122 . 64 "
8,000'	34.04 "	1666 X 1333	999 . 68 "
7,000'	29.82 "	1458 X 1166	874 . 72 "
6,000'	25.56 "	1250 X 1000	749 . 76 "
5,000'	21.03 "	1041 X 833	624 . 80 "
4,000'	17.04 "	833 X 666	499 . 84 "
3,000'	12.78 "	625 X 500	374 . 88 "
2,000'	8.52 "	416 X 333	249 . 92 "
1,000'	4.26	208 X 166	124 . 96 "



In Aerial Map Making, an Automatic Film Camera is Used. The Diagram and Table Above Indicate the Areas Covered by Each Exposure When the Flier Operates at a Given Speed at Various Altitudes. This Chart Shows the Intervals of Exposure for One-Inch Overlaps on a Five by Four Plate with an 8-Inch Lens. It Is Thumb-Tacked on a Board across the Knees of an Aerial Photographer Just above a Map of the Section over Which He Is to Fly. The Map Winds from Roller to Roller. If He is Flying 60 Miles an Hour, at 1,000 Feet Altitude, the Chart Indicates That the Plunger of the Camera should be Set for Every Four and One-Fourth Seconds to Secure a Continuous Overlap Photograph, Such as Is Shown Here

The map camera was evolved because plates were not completely satisfactory for the work, often not getting all of the ground beneath. This camera holds a film long enough for 120 exposures, and the photographer carries quantities of extra magazines so that he returns to headquarters with hundreds and hundreds of views of the enemy's fields. Within this camera are cogs which carry the film past the shutter steadily and surely. They also open the shutter at regular intervals, close it, wait until the stated time is reached, then open it again, taking a never-ending series of pictures of the ground beneath, each photograph overlapping its predecessor slightly.

All the driver of the machine does is fly until he reaches the altitude and destination for which his camera has been set by his officer, reach out his hand and touch a button among his controls, which sets the camera working, and then fly on a level over the territory which is to be mapped at that time.

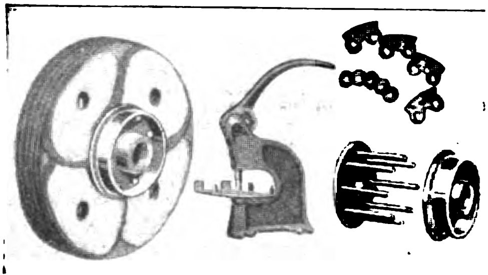
He is responsible for the map of the particular 16 square miles which is assigned to his "photo section." He covers the ground, part of it one day, part another, as the weather and Huns permit, but it takes a dark, dark day and a fierce, fierce cannonade to keep him down. The moment he has taken every foot of his territory, he starts again and does it once more. His work is standardized. He knows just how many square yards he is photographing at a certain height. For instance, at 10,000 ft. he is getting a square mile on each picture at a speed of a mile a minute. If he is nearer the ground, or traveling faster or slower, the amount of surface in each picture will vary, for the camera is paying no heed, grinding off the pictures at the scheduled rate.

When he returns, his films are developed, prints taken, joined together by means of the overlapping system, and thus a complete and enormous picture of his section is made.

(In the April number, the wonder of the camera's spy accomplishments on German batteries, and the tricks of the stereoscopic method of aerial photography will be described.)

MAKES NEW BUFFING WHEEL FROM SAVED STUBS

Buffs used in metal polishing are frequently discarded when worn down to a diameter less than six inches. With the aid of a special steel hub now on the market, this waste can be redeemed, using several buff stubs to build up a new buffing wheel. The steel hub, in two parts, carries eight pins parallel with the shaft. Worn buff sections punched with two holes are thrust upon these pins, two pins to a section, four sections to make a complete circle, like the leaves of a four-leaf clover. Another layer of sections is then laid on in the alternate position, covering the spaces between the "leaves" of the first. Six layers in alternate positions, or 24 worn buff sections, make a 14-in. buff wheel of good face. It is balanced, if necessary, with lead, and the whole is clamped with the end of the hub, whose perforations fit the pins. When this composite wheel is worn down to the discarding point, the resulting waste is inconsiderable.



A Number of Worn Buff Stubs, Assembled on This Steel Hub, Make a New Buffing Wheel

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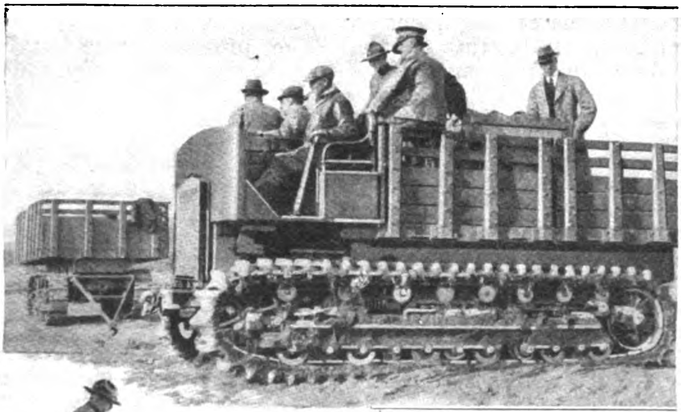
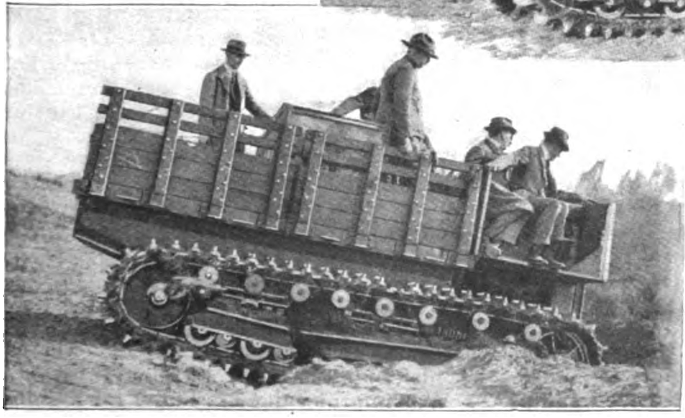
ℭ The casualties of New Zealand, according to report, totaled 57,932, of whom 16,500 were killed and only 45 taken prisoners.

BIG TRACTOR PULLS TRAILER OVER MARSH AND MUD

Ability of the heavy track-laying type of tractor to cross soft ground "with a light foot" is illustrated by the performance of such a machine weighing with its load over 11 tons, which pulls a loaded trailer across marsh and mud too soft to support men or horses. The reason for this is that the man of average weight puts a pressure of at least nine pounds to the square inch on the soles of his shoes. The unit pressure of a horse upon his supporting surface is much greater. The tractor, heavy as it is, bears upon the large surface of its creeper treads with a pressure of only 3½ lb. per square inch. The American-designed track-laying tractor is able to negotiate with full load a 100-per-cent grade on firm ground, and a 50-per-cent grade of the worst mud and slime. Tractor and trailer



The Trailer in the Background Has an Endless Tread Like Its Tractor, and Together They can Make Good Speed over Very Soft Ground



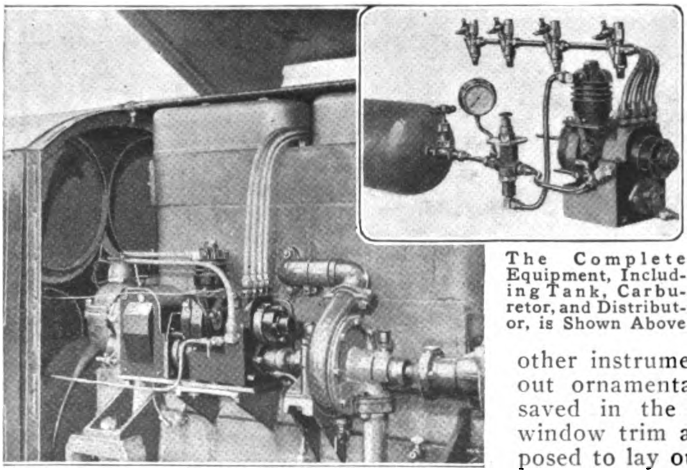
This Tractor, Weighing 11 Tons with Its Load, Is About to Descend a 100 Per-Cent Declivity and Then Ascend It

together carry a load of ten tons. For military use such a unit can keep up with troops advancing over terrain of any character.

HEAVY-DUTY MOTOR STARTER IS QUICK-ACTING DEVICE

Intended especially for heavy-duty work such as aeroplane, truck, and tractor motors offer, a starting apparatus that utilizes the carburetion principle seems worthy of attention even though it is not a strictly new development. "Instantaneous" starting is the outstanding advantage of the equipment, which, it is claimed, will cause a motor to fire in one or two seconds even under extremely severe conditions. This is accomplished by filling the cylinders in firing order with a compressed-gas mixture, the explosion of which gives life to the engine.

The installation consists in part of a special carburetor that operates only when the motor is being started. Air from a compression chamber, in passing through it, is converted into a volatile mixture and delivered by a timed distributor to the cylinders on their respective power strokes. Compressed as it is, it first actuates the pistons and then, upon ignition, starts the engine. The procedure continues until the motor begins its regular cycle of operation. With air compressed to 250 lb. in the tank, an engine may be started about 15 times without recharging. A motor-driven pump refills the chamber in three minutes when set in motion by touching a button. Air may be taken from it for inflating tires. The outfit, said to be in use on hundreds of military aeroplanes, weighs only 30 lb. That for tractors and trucks weighs about 50 lb. In both instances the equipment is of compact form. To start a motor, the driver has only to press a button.



The Complete Equipment, Including Tank, Carburetor, and Distributor, is Shown Above

A Glimpse beneath the Hood of a Motor Truck, Showing the Relative Compactness of the Installation: The Compression Cylinder is Not Visible in the Picture Presented Herewith

AUTO SPRINGS ADJUSTABLE TO WEIGHT OF LOAD

Car springs adjustable to the weight of the load are the feature of a French invention which aims to secure equal comfort for one or the maximum number of automobile riders. At each end of the rear springs is an elongated slot, in which the eyebolts can be moved by a lever or wheel at the driver's seat. The effect of altering the position of the bolts is to lengthen or shorten the springs, thus decreasing or increasing their stiffness and resistance. Definite positions or stopping points are provided for the sliding bolts, so that the driver may adjust his springs to a specific number of passengers.

BUILDING FOR BACHELORS HAS UNUSUAL FEATURES

An unusual type of rooming house for men only, somewhat resembling a hotel or a club and yet different from both, has recently been opened in New York. The demand for these novel bachelor accommodations was so great that every room was rented before the building was finished. Many features similar to a Y. M. C. A. building are provided, including a gymnasium and general lounge room. There are also three soundproof rooms where musicians can practice on pianos or other instruments. The rooms are without ornamentation, and much cost was saved in the construction by omitting window trim and baseboards. It is proposed to lay out a covered garden on the roof.

¶All the properties used by the late Richard Mansfield in his repertoire of historical characters have been donated by his widow to the National Museum at Washington, and are now on exhibition.

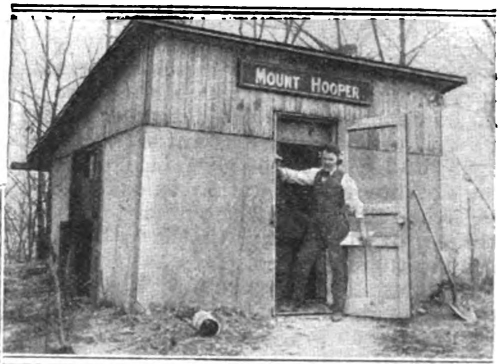
WIRELESS "AERIALS" UNDER GROUND AND UNDER WATER

By R. H. LANGLEY

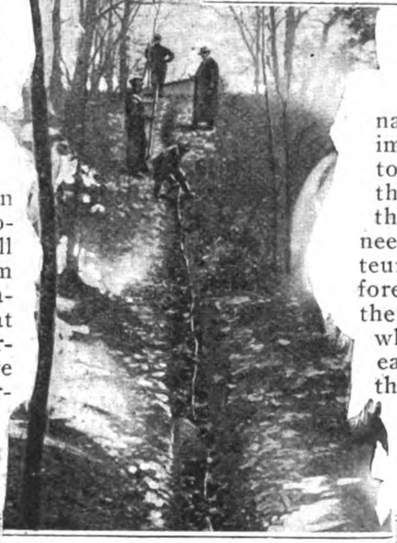
AERIALS buried in the ground and trailing in the water! This is the latest thing to be announced by the Navy Department as one of its war-time radio secrets. The one part of every wireless station which everyone knew about and believed to be essential was the system of wires strung high in the air. Now we are told that these wires may be buried in the ground, or trailed in the water behind a submarine, and that they will still catch the signals from distant transmitting stations. We are even told that in many cases these underground wires are more effective than the overhead aerial system would be.

It is to Dr. James Harris Rogers that the nation is indebted for this important discovery. Doctor Rogers is a member of the Washington section of the Institute of Radio Engineers. He had his own amateur wireless station long before the United States entered the war, and is among those who have carefully followed each new development in the art. Today he takes his place as one who has himself made a valuable contribution.

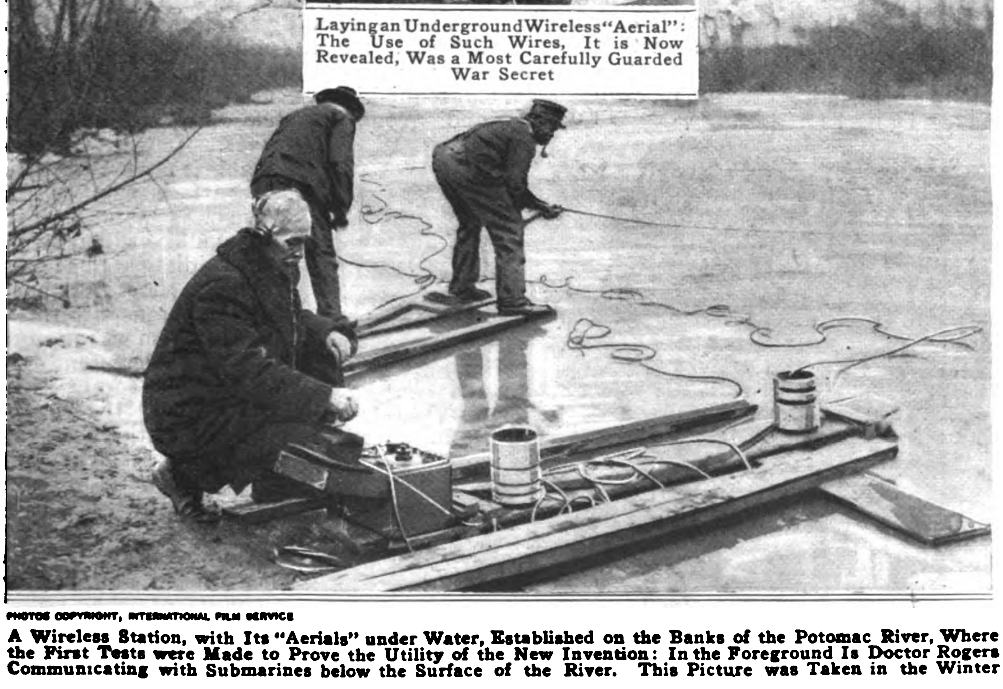
An insulated wire is



A Field Station from Which Many of the Early Experiments with Underground Wireless Antennæ were Made



Laying an Underground Wireless "Aerial": The Use of Such Wires, It is Now Revealed, Was a Most Carefully Guarded War Secret



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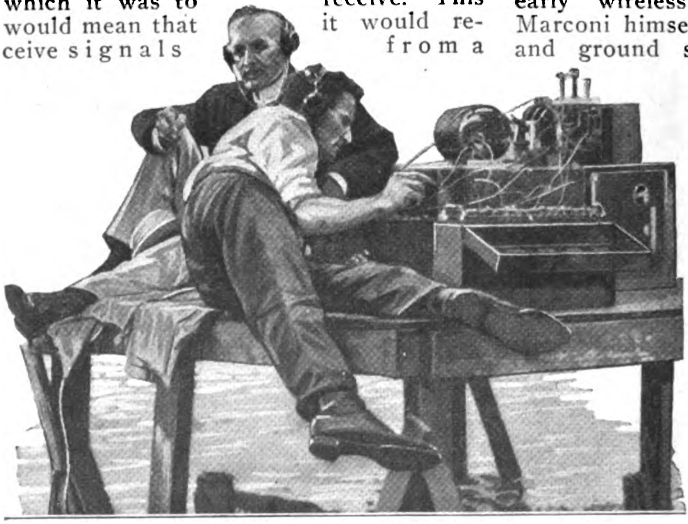
A Wireless Station, with Its "Aerials" under Water, Established on the Banks of the Potomac River, Where the First Tests were Made to Prove the Utility of the New Invention: In the Foreground Is Doctor Rogers Communicating with Submarines below the Surface of the River. This Picture was Taken in the Winter

laid in a trench a few feet below the surface. The depth to which the wire is buried depends upon the character of the ground, and whether it is normally wet or dry. The length of the wire depends upon the distance to the station whose signals are to be received, and also upon the sensitiveness of the receiver that is to be used. The instruments themselves are the same as those used with regular aerials, and they may be located below the surface or above ground. Then the "earth" terminal of the receiver is grounded in the usual way, and the signals come in as well, and in many cases better, than they would from the usual antenna high in the air. In the same way, an insulated wire is run out through an insulator in the tail of a submarine, and is allowed to trail out behind when the boat is submerged. Here again the waves from some distant station, which have always been supposed not to be able to penetrate below the surface, are picked up by the wire and sent back to the receiver inside the submarine.

Doctor Rogers realized the military importance of his discoveries, and at once put them before the Navy Department. Representatives of the navy were invited to witness demonstrations at Hyattsville, Md., and were quickly convinced of the great usefulness and practicability of the system. They realized that the buried wire was much cheaper to install than the overhead system. They also knew that it would be highly directional if laid in the general direction of the station from which it was to receive. This would mean that it would receive signals from a great distance in this direction, without being disturbed by signals, even of the same wave length, coming in other directions. The tests also showed that these buried wires did not pick up nearly so much of the static disturbances which have always been the greatest limitation on the distance from which signals could be received.

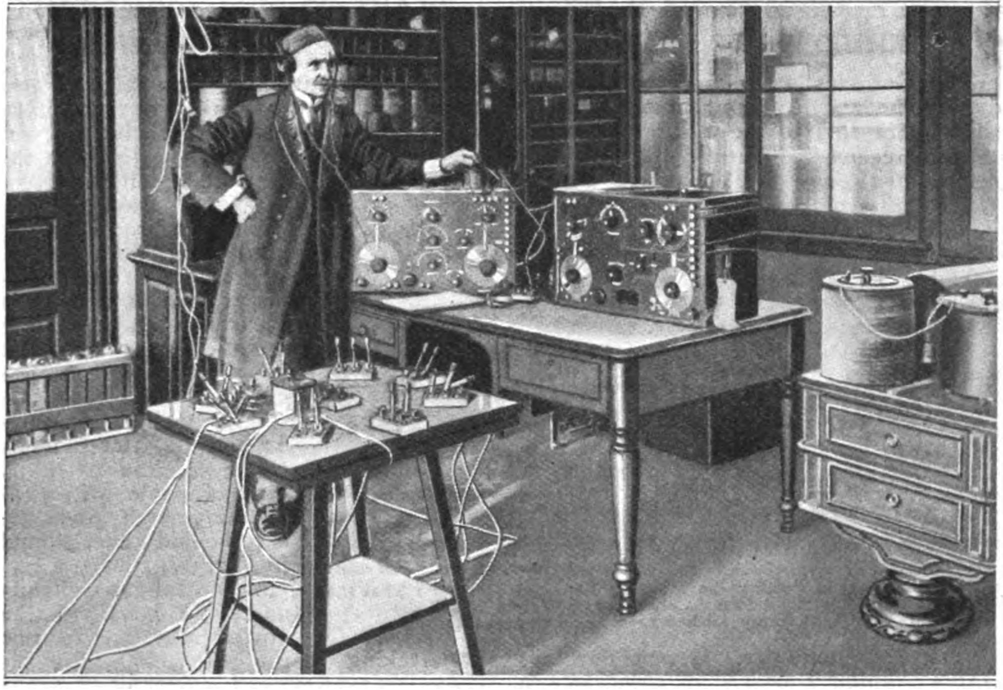


A Wireless Station of the New Type on a Pier near the Mouth of the Potomac River: The Operators are Sending Messages to, and Receiving Messages from, Under-Sea Craft Submerged Some Distance off Shore

It seems that Doctor Rogers was the first one to attempt any practical application of facts which were pointed out by some of the earliest wireless investigators. In 1898, A. Blondel, of the French Society for the Advancement of Science, proposed the theory that the waves of radio telegraphy were "surface" waves; that is to say, waves that traveled, to a large extent at least, in the surface of the earth. In 1902, other scientists found that the waves could be considered as consisting of two parts, a "space" wave and a "surface" wave. The space wave spread out equally in all directions, up as well as horizontally, while the surface wave spread out in the upper layers of the earth's surface, horizontally only.

It was also shown that depending upon the nature of the earth's surface, and the relative amounts of absorption in the air and in the earth, the surface wave at great distances from the sending station might be much the larger of the two. But since the station that sent out these waves consisted of an antenna high in the air, with one end electrically connected to the earth through the transmitting apparatus, the early wireless investigators, including Marconi himself, used the same antenna and ground system for receiving the waves. It seemed reasonable to suppose that the surface part of the wave was unimportant, and would ordinarily be entirely dissipated at only a very short distance from the transmitter.

The system was used to a considerable extent during the war, communications from the high-powered stations in Europe being received here on underground-antenna systems constructed at Belmar, N. J. The navy station at New Orleans was also so equipped on account of the severe static which is encountered there. American



Interior View of Doctor Rogers' Laboratory in Hyattsville, Maryland, Where He Conducted Investigations and Experiments Which Undoubtedly will Result in Every Large Wireless Station being Equipped with a Receiving Antenna Placed Underground

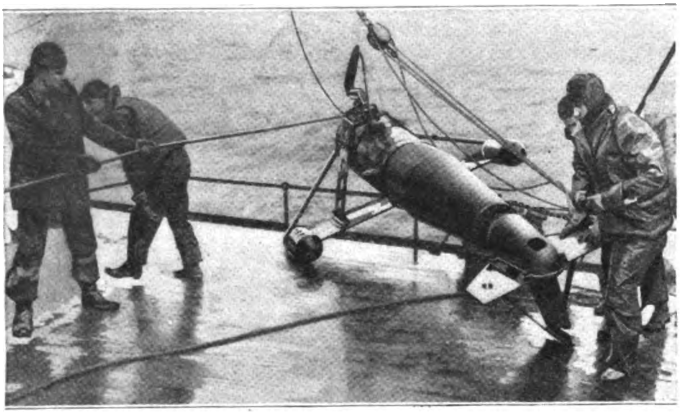
submarines have also been able to keep in touch with their base of operations, even when submerged, by using the trailing wire. It has further been found possible to transmit from these buried and submerged antennæ, but so far only short distances have been attained. This, however, is not nearly so important as the fact that signals may be received from greater distances.

Those who have been following developments in wireless will remember the remarkable results which were obtained, in 1912, by Edwin H. Armstrong, then a student at Columbia University. Armstrong used a very long antenna consisting of a single wire supported 20 or 30 feet above the ground on a line of telegraph poles. In the fall of 1918, another investigator announced that these low antennæ, such as Armstrong used, were quite as effective as the high ones for transmitting as well as receiving. Now Doctor Rogers tells us that wires buried in the ground are, in certain cases at any rate, better than either of the two earlier forms for receiving. And last of all comes the statement by Nikola Tesla that wireless messages do not travel in the air at all, but that the wave that is actually received has traveled directly through the ground from the transmitter to the receiver. When these investigations have all been concluded, perhaps we shall see all the costly towers and masts taken down and replaced by buried wires. The navy experts do not believe that the high aerials can be dispensed with for transmitting. But the radio world has been set to thinking along new lines, and is at the same time going ahead with exhaustive investigations. It is not too much to prophesy that in the very near future every large wireless station will have a receiving antenna in the ground.

CLASSES IN TRACTOR DRIVING FOR CALIFORNIA BOYS

That the state may have a sufficient number of tractor drivers to cultivate the maximum amount of land, and so increase the food supply, the California State Board of Education has been conducting emergency classes in tractor operation in the rural districts. The course given lasts three weeks and costs only $2.50. The first week, the students are taught the theory and principle of gas engines; the second week, the assembling and disassembling of tractors, their operation and repair, and the third week they drive tractors in the field.

MYSTERIOUS "P. V." MADE MINED WATERS SAFE



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A Paravene Used in Cutting the Mooring Ropes of Mines So That the Allies' Ships could Pass Safely through Waters Which the Germans Supposed had been Made Impassable

The Germans were repeatedly baffled, during the war, by the fact that British ships were able to move through mined waters with immunity. It now develops that a cunningly devised machine, in use since 1916, and known to British sailors as a "P. V." or "paravene," was largely responsible for this. The device, the nature of which was one of the mysteries of the war, is torpedo-shaped, with finlike projections either side of its head and a special rudder which regulates the depth at which it travels below the surface. A cable connected with the ship controlling it caused mooring ropes of mines to travel toward the nose of the "P. V.," where a saw quickly severed them. As the mines rose to the surface they were destroyed before doing any harm.

SEWER RUNS ABOVE GROUND ON CONCRETE TRESTLE

A concrete sewer, made of 15-in. and 18-in. reinforced-concrete pipe, runs for 4,000 ft. above ground on the outskirts of Columbia, S. C. The pipe is supported by a reinforced-concrete beam, 12 by 16 in., run on a trestle of concrete bents, 20 ft. apart. Bands across the top of the pipe are bolted to the supporting beam to resist the vertical, lateral, and twisting strains of flood water, which at times covers the pipe. The exposed sewer is part of a recently laid system of 6¾ miles, the balance of which is of the usual subterranean type.

PLANT TO PRODUCE ARGON FOR ARMY BALLOONS

The important part which balloons play as an adjunct of both the army and navy has caused those two branches of our government to share the expense of constructing a plant at Fort Worth, Tex., for producing argon from natural gas. Argon is a noninflammable gaseous element of great value in preventing fire and explosions which are apt to attend the use of hydrogen. The latter is much used in inflating lighter-than-air craft. A line of 10-in. pipe, capable of withstanding high pressure, is to be laid underground to Fort Worth from certain natural-gas wells situated 94 miles to the north. Materials for this undertaking costing $1,050,000 have already been purchased. The plant is not being built near the wells, because they are too remote from water, power, and the labor market. After the natural gas has been processed at the government plant for its contents of one per cent argon, it will be discharged into the Fort Worth and Dallas city mains.

KNITTED STUMP SOCKS FOR WAR CRIPPLES

Stump socks are knitted articles for which a large need has been created by many a soldier's loss of a leg or an arm. They are knitted much like ordinary socks but without heels and are straight throughout. The article is worn over the bandaged stump to give it additional protection. Different patriotic organizations, including the Service League for the Handicapped, has undertaken to supply these socks. In some cases they are made with a draw string by which the top can be gathered. Others do not have this feature.

COMMENT AND REVIEW

[These pages were printed January 23, 1919]

Wireless to Other Planets

FURTHER development in wireless promises to take first place in scientific interest. Experiments with steel tubes in place of glass tubes reveal possibilities of wave projection far beyond the most sanguine hopes of a few years ago. Apparatus already constructed yields a projecting force sufficient to reach around the earth three and one-half times. Marconi in a recent interview even suggests ultimate communication with other planets. Until recently the distance a wireless message could be sent was largely a matter of power at the sending station. Even this will doubtless yield somewhat to improved apparatus, for it will be remembered when the first Atlantic cable was completed, the operators failed to get results at first, due to too much "juice." Cell after cell of battery was added to no avail until some one suggested trying the line with only a few cells—which worked.

The very thought of communication with other worlds opens up such endless possibilities of knowledge as to constitute the most alluring task to which science has ever set its hand. Ours cannot be the only inhabited world, and with all our vaunted learning and mechanical accomplishment, we may in fact be the merest beginners in comparison.

We cannot dream of the mysteries to be revealed, or the knowledge to be unfolded. In other worlds, have they eradicated sickness and pain; have they thousands of years ago discarded our best methods of transportation, communication, heating, cooling, eating, clothing, and agriculture? Of what shape and size are their bodies; how long do they live? Has Christ yet appeared to them, or are they living in a millennium? When we establish communication, will the knowledge we obtain be all useful and helpful, or shall we be made unhappy and dissatisfied with our own conditions because incapable of attaining to their high degree of life? Questions and conjectures can be multiplied so indefinitely as to stagger the imagination.

It is entirely possible that other planets have had intercommunication for centuries, and that we are still in the beginners' class. Marconi states that waves have been detected on their receiving instruments which could not be accounted for as coming from any station on this earth, nor from natural sources, and which are believed to be signals from another world trying to establish communication with us.

The Future of Wireless

WHEN Marconi reached out into the ether, and grasped the waiting secret of sound waves, he unfolded a mystery destined to save the lives of thousands who "go down to the sea in ships." Like most other good things, wicked men perverted his system to unholy purposes, for without wireless the Hun submarine would have failed in much of its cruelty. The war, however, gave a great impulse to wireless, which recently found its culmination in those wonderful instruments which enabled our ground officers to converse with our airmen, while aloft, even at a distance of five miles. That this distance will be extended under the more favorable conditions of peace, may be confidently expected. With the censorship relaxed we may count on wireless stories of actual accomplishment on water and in the air, more thrilling than Jules Verne ever dreamed of.

Before we entered the war thousands of keen-minded high-school boys, and some girls also, had mastered the rudiments of wireless operation, and were sending and receiving messages from points many miles apart. This voluntary self-instruction justified itself, for the sudden demand for thousands of wireless operators found hundreds already prepared, and thousands so nearly so that their necessary instruction to qualify as radio operators was comparatively brief.

With our entrance in the war, the wireless outfit which in city and country towns was everywhere indicated by wires stretched from house to house, or house to barn, became a positive menace. It put into the hands of the enemy in our midst a simple and dangerous weapon; hence the only recourse was to abolish all wireless in civilian hands. Its possession in an operating condition was like owning a moonshine still.

It may not be expedient as yet to lift the embargo on amateur wireless, perhaps not before the Peace Conference has finished its work and the treaty is signed, but it is to be hoped that at no distant day Young America may again rejoice in that most fascinating of all instructive amusements a boy ever had. It may doubtless be desirable still to control the use and ownership of wireless outfits, by permit from the Government, but that would not prevent its use by those who deserve to enjoy it. With one's loyalty established, the only further objection would seem to be in the ability to read messages of a business or confidential nature, but this too, doubtless, can be safeguarded. If possible the boys should have their wireless.

The commercial feature of wireless has been somewhat lost sight of during the war, but may now be expected to assume a greater importance than ever. Recent improvements of a most important nature promise greater speed and accuracy with greatly increased possibilities as to distance, by day as well as night. Marconi announces his expectation to reduce ocean rates far below the present cable tolls.

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The Government in Business

THERE are some things which the Government must necessarily do, and there are other things which it seeks to do. Outside of those few things which are essentially the function of a government to do, what is there it has ever done, which has not been or would not be better done, and at less cost to the people, by private enterprise? In order to make a showing a government may reduce the price of a service, but it so reduces the value of the service, that the apparent saving becomes instead a high ultimate cost to the consumer.

As a war measure the country cheerfully accepted the taking over of the telegraph lines. Under the circumstances a restricted service was to be expected. The continued operation of the telegraph and telephone service by the Government, promises increasing inefficiency. It is the logical, inevitable result of permanent Federal operation. Anyone who ever attempted to use the telephones of England and the continent before the war knows what a fearful exasperation they were. The explanation is simple. A government employe quickly comes to feel a certain sense of security in his position, and a corresponding indifference to the loss of that position through inefficiency. Especially so with us, where the majority of government positions are secured through a "pull." The feeling is that the pull which placed one there can and may be depended on to keep one there. We are speaking not of cases of dishonesty but simply of inefficiency. Go into any Federal office where a considerable number of clerks are employed, and compare the morale with that of a civilian enterprise with an equal number of employes. In the first there are laxness, deliberateness, and usually some actually doing nothing. Repeated visits will prove the condition is the usual one. On the other hand, the employes in a civilian establishment are active and busy, with a minimum of lost motion. Here individual effort, worth, ambition, results, are the measure of continued employment and advancement. Under Federal operation individual ability seldom counts as much as the pull, hence little incentive to doing one's best.

This atmosphere of security together with the endless red tape which prevents quick action and a short cut to results make for expensive operation. In conducting a war, cost is seldom considered; the emergency is taken to warrant any cost. Under peace conditions there are few such emergencies, but the principle of disregarding cost remains. A corporation must constantly watch for leaks and wastes, find them promptly, and stop them instantly. No such requirement exists in Federal operation—in fact the government treasury seems so huge it is hardly worth one's while to raise disturbing questions which, more often than not, instead of being appreciated turn out to be an unpleasant boomerang. It is not actual dishonesty, in the terms of a defaulter, or even graft, which makes government operation unprofitable; it is the loss which comes from continuous low estimate of one's obligations as an employe. The immediate head seldom has the authority, or is permitted, to discharge utterly inefficient help, for that ever-present pull restores them after a few days with more than a hint not to repeat the "mistake."

This condition is general, as anyone can easily determine. It may not be possible to correct it, but there certainly is no need or excuse to enlarge its sphere.

The ocean cables were recently taken over by the Government. During the entire war period, since 1914, the cable companies, even with the tremendous burden of war messages, managed to furnish a very acceptable business service. One high official stated a few days ago, it had been possible even to send a message from San Francisco to Japan and receive a reply within an hour; now, under government operation, the same service is a matter of days, as many as seven days in some cases. To continue Federal operation of telephones, telegraphs, and cables would be little short of calamitous to business interests. With reasonable restrictions, the corporate operation of these utilities will be a better service at less cost than the Government can ever hope to attain. Except as a great provider of jobs for political appointees, there is nothing the Government cannot secure from the wire systems under corporate operation it could hope for by conducting the business itself. As for the employe, unless he is a rank slacker, his chances for recognition of meritorious service are all in favor of corporate management.

The fewer government employes consistent with actual necessities, the better, and the less the cost for the people. All the great business enterprises recognize this. The steel companies buy many things they need, cheaper than they can produce them in their own plant. Railroads do not make their own car wheels. A great standing army of government employes is as bad as an unnecessarily large standing army. Each is a burden on the country; consuming without producing.

To add the wire systems would be to increase their cost while decreasing their efficiency.

Competition makes for the best at the lowest practical price. We had better spellers in those days when the class used to toe a crack in the floor and "spell down" than we have ever had since. Under government operation there is no competition. The one or two per cent saved in interest charges on capital account are eaten up many times by increased cost of operation.

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Bolshevism

THOSE who make no pretense to a knowledge of political economy, and even the saner class of socialists, are gradually coming to understand the utter hopelessness of Bolshevism. To put oneself, and family, and property, in their keeping is to put to sea in a storm in a leaking boat, with an insane pilot. No prominent Bolshevik has ever demonstrated his ability to rule wisely or manage public affairs. On the contrary, Bolshevism is essentially destructive, both to life and property. It is entirely an experiment, with as much promise of desirable results as one expects from a drunken man letting off firecrackers in a powder magazine.

Bolshevism has destroyed hundreds of houses and barns; it has not built one.

Bolshevism has burned countless warehouses filled with supplies; and factories, and workshops. It has never planned, or erected, one to take their place.

Bolshevism has tortured and killed untold numbers; it has never brought security, and protection, and a steady income to one workingman.

Bolshevism has drained no swamps, has irrigated no barren land; it has no schools where little children may learn, or sanctuaries where man may worship. It recognizes no God, and no rights but those of its own brute strength. Like any other ferocious animal, it can, in a moment, tear down, and in pieces, the work of years; but not in a century can Bolshevism build up and create. It offers nothing whatever to make the world a better place to live in; it brings only apprehension, fear, famine, and despair.

It is an ignorant mob indulging in a wild, prolonged debauch, and must eventually and inevitably perish from its own lack of cohesion.

If every man, woman, and child in the world was an active Bolshevik there would shortly be none left alive, for they would rend each other in pieces, and the survivors would die under the tumbling ruins of civilization. The avalanche, the earthquake, the tidal wave, and the cyclone are all demonstrations of irresistible power; they are awful, fearsome, and sweep away everything in their path; yet none of them endure.

Let any who incline toward Bolshevism think on these things.

* * *

Does Army Life Make for Inefficiency?

"PUT him in the army and make a man of him," is a quotation which antedates the recollection of the oldest inhabitant.

The regular life, the physical training, the respect for authority, the prompt response in action and word, the military bearing; all these and many more attributes attach to our lifelong picture of the soldier who was once even a sluggard. Army life was supposed to work wonders, if not almost miracles.

The foregoing is true and it isn't.

What is the general experience of the business man and manufacturer who is bending all his energies to make a place for the soldier returning to civilian life? In most cases he is really in need of man power, either to fill vacancies or to replace boys and young women in occupations for which the latter are partly or entirely unsuited. In some cases the position is more or less a created one. Both types of employer are trying patriotically to coöperate with the War Employment boards, whose function it is to find work for mustered-out men.

The remarks immediately to follow are not intended to apply to the boys returning from overseas, for not enough of them have at this date been restored to civilian occupations to afford any fair judgment. We refer instead to the boys who are daily being released from camps and cantonments in this country. Some have been enlisted only a few months, others a year. What is the present efficiency of these returning men? And what is the reason for the mental condition in which they are returning? For exactness, let me describe the few examples within my own personal knowledge.

Here are three young men around 21 years of age, of good families, with high-school education, who left positions with high-class manufacturing concerns, to enlist. These concerns are known to retain in their employ only bright, efficient young men. It is fair to presume that they were 100-per-cent efficient in their previous positions. What is their efficiency now? Physically they are in the pink of condition, but they appear to take no interest in their work; in moving about they walk at a funereal pace, with a lazy shuffle; they display no initiative; they arrive late in the morning; they do their work indifferently and carelessly; their production is about half what normal production should be. Not a little of their work has to be done over a second time; they resent friendly criticism, and finally, after a few days, they quit. Another employer tells me that of 17 men sent him, all had quit before the end of the week, and the next week, out of 11, only one remained to draw pay Saturday. During the time they worked, their efficiency was very poor. Each of the 31 men mentioned had been a private. Other employers state they are having the same experience. The condition would appear to be general.

It is doubtless unfair to condemn the boys for this unfortunate condition in which they find themselves, for they are not entirely to blame. It is probably the result of the reaction which will take some time to overcome. Perhaps, and even probably, if the men in this country who had been busy each day with drills and camp work could have been demobilized on November 12 and immediately sent home, results would have been different, or at least modified. But there has elapsed two months of inactivity, with the relaxation of morale which accompanied the knowledge they were not going across, and hence an inevitable loss of interest in everything pertaining to camp life and work. An old-line army officer would have felt it less, but the thousands of civilian officers naturally shared the same feeling as their men. "It is all over, so what's the use!" explains matters. A young sailor of my acquaintance who was in a naval camp tells me that for weeks prior to his discharge his comrades actually begged for something to do. What then, must be the effect of enforced idleness on the thousands who may not be mustered out for weeks or even months to come?

The reaction from the superactive military life to one almost purposeless naturally carries the pendulum over to the opposite extreme, and as with all extremes, normal conditions are upset for a time. Then gradually comes a return toward normal. This takes time; it simply cannot be accomplished in a moment.

In the case of officers, who are supposedly better educated, a stronger mental balance may be expected, but even here there will be some disappointments. To both officers and privates the change to civil life is marked. The officers have become accustomed to much order giving and exhibitions of respect from their men; the men have enjoyed the many favors and courtesies extended because of the uniform they wore. To all of them has been offered a good deal of hero-worship sentiment. As they get back on their old "jobs" they are going to miss all this, and for awhile will feel as if they are not being suitably appreciated.

The thought which comes to me in this connection is, first, that employers having these conditions in mind should exercise as much patience as possible, and by talking with the returning men suggest to them the necessity for an extra effort on their part to make good; that it will come a little hard at first, just as the first few drills were hard, but by earnest effort they can soon bring themselves back to old-time efficiency. Second, that the men themselves take a mental inventory of their own feelings, and reluctance to work, which is not unlike that of the small boy in his first week at school after the long vacation. The old tasks seem an awful drudge, but after ducking under a few times they find the water is fine.

So, Soldier boy and Sailor boy, if the old job seems hard, or stale, or uninteresting, don't give yourself up to careless indifference, but exert just a little of that splendid spirit you had built up for use "over there" and conquer yourself with the same irresistible force with which you would have gone after the Huns; and of the two efforts, I am not at all sure that bringing yourself up to concert pitch again in the requirements of civil life is by any means the lesser or easier task. You will do it, for it's in you even though a bit rusty; and when you once realize what our own country and the world demand of our man power in peace, and the wonderful possibilities opening to us as individuals and a nation, you will be just as keen to get to the top as you were a few months ago to "go over the top."

The Victory Loan

DID you ever live in a country town whose fire department was composed of volunteers? And did you ever notice how keen everybody was to run with the cart and help lay a line of hose, and what a scramble to hold the nozzle? But when the fire was out, the crowd dispersed, and few were left to be impressed; the most officious disappeared on one excuse and another, leaving the few faithful, conscientious workers to clean up. Of course there isn't any excitement in reeling up a lot of wet, dirty, cold hose, but it has to be done after every fire; and those who should, and don't, are slackers.

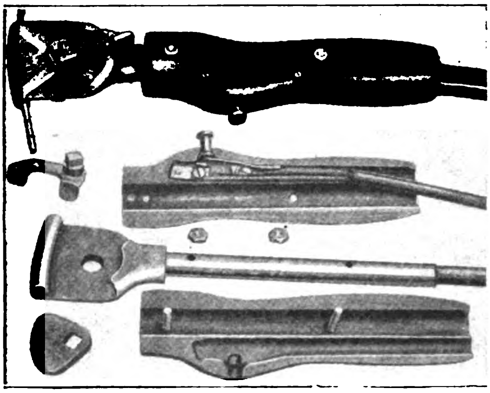
Six months ago the prospect was that the Government would be obliged to put out a big Liberty loan every three or four months, for an indefinite period. Happily this has not been, and will not now be, necessary. The fire has apparently been subdued, the world conflagration has been checked, the gale which drove the sparks every way is subsiding, and we hope the danger is over. Now there remains the hose to gather up, and some of it to replace, with comparatively few ladders that were lost or broken; but taken altogether our loss has been small compared to that of other countries. In fact, it might with propriety be called a "Thanksgiving" loan. As the Victory-Liberty loan it offers the double opportunity of celebrating the great victory, and also as an expression of thankfulness that we did not have to go on for months and years at an awful cost of precious lives. Any sacrifice of mere dollars in order to put the loan over promptly is so insignificant compared to the price we might have been called upon to pay, that the nation should cheerfully shoulder the load. Had the war continued, even this country with all its money and resources would have soon felt its depressing effect. Because the living of our usual life has been so slightly interfered with, few realize the many sacrifices that would soon have been necessary. For these reasons alone we should put the loan over quickly, patriotically, willingly.

Picking up the hose isn't an exciting job, but we must not say to the world we are slackers by failing to do so, even though we lack the excitement of daily combat to spur us on.

H. H. WINDSOR

ELECTRODE QUICKLY CHANGED IN NEW ARC-WELDING TOOL

A handy arc-welding tool has recently been devised, one of the advantages of which is that the electrode can be changed with little loss of time. In case the electrode adheres to the work the necessary amount of pull can be exerted on the former without dislodging it from the grip of the tool. The current enters a shank inclosed in a handle of insulating material and passes to a broad, flat head having a curved flange at its outer end. The electrode is clamped between this flange and a movable member controlled by a small lever. When remote control is employed with a closed-circuit system, the tool is provided with a trigger projecting from the side, by which the current can be turned on and off.



An Arc-Welding Tool, Having a Head So Designed That the Electrode can be Changed Quickly When Desired, and Its Parts

¶Makers of gold-filled, plated, and gold-shell rings have agreed to adopt a standard system of marking devised by the Bureau of Standards, which will tell, by means of a fraction before the usual carat mark, what part of the entire weight of a ring is composed of gold.

AMERICAN BATTLEPLANE SETS NEW SPEED RECORD

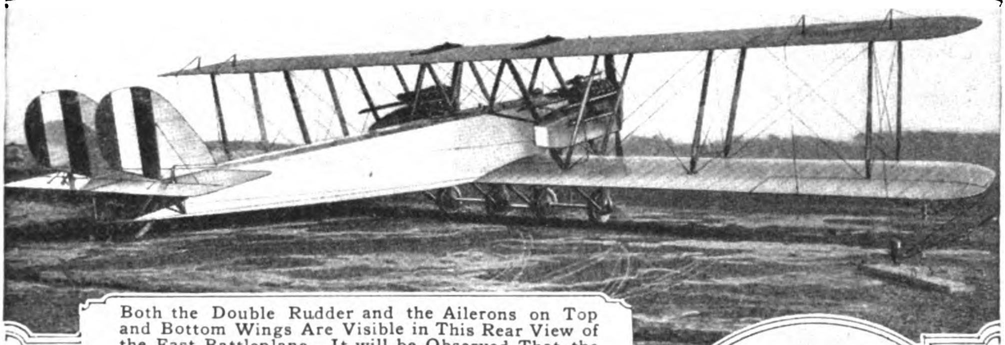
By H. A. MOUNT

HAD the war lasted until spring, German pursuit pilots probably would have been surprised to see a fleet of great bombing machines sail unconcernedly into "verboten" territory in broad daylight. And the Hun pilot who attacked, expecting an easy victory over his unwieldy antagonist, would have received the surprise of his life. For the great bomber would have proved as fast and as agile as his own smaller machine and would have been protected by five machine guns that covered every possible angle of approach.

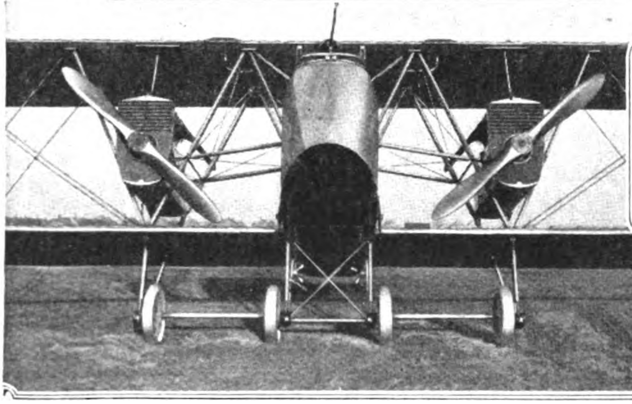
As it was, only a few of the great fighters got into the hands of the army fliers, and none of them reached the firing line. But official tests showed, in spite of great size and enormous carrying capacity, the plane was so versatile that it could have been used to equal advantage as a pursuit machine and as a day or night bomber. The great 75-ft. plane is said to be the first of its size successfully to perform all the acrobatic "stunts" required of a pursuit machine. Not long ago it flew from Dayton to Cleveland, a distance of 215 miles, in 1 hr. 15 min., thereby establishing what is believed to be a new world's record. The average speed during the flight was 172 miles an hour. The fastest trip previously made between these two cities occupied two hours. The tools, fuel, and baggage carried by the plane weighed 2,500 pounds. The machine is known as the Martin gun machine and was designed by Glenn L. Martin. It was the first all-American design accepted for battle use, and was just getting into production when the armistice was signed. The plane, however, is easily adaptable to commercial requirements; a passenger machine with a capacity for 12 persons and a freight-carrying machine with a two-ton capacity are now building. They are altered from the military design only as to interior equipment of the fuselage.

In the passenger plane, upholstered seats are arranged side by side within an inclosed cabin, provided with windows. Entrance is by a trapdoor and folding steps through the cabin floor, just back of the wings. The freighter will first be used in mail service.

As compared with the English Handley Page, the Martin plane has a 75-ft. wing spread, instead of a 100-ft. The total weight is slightly over half that of the English design. Driven by two Liberty motors, it has a guaranteed speed of 120 miles an hour, while a Handley Page, with the same power plant, makes about 80 miles an hour.

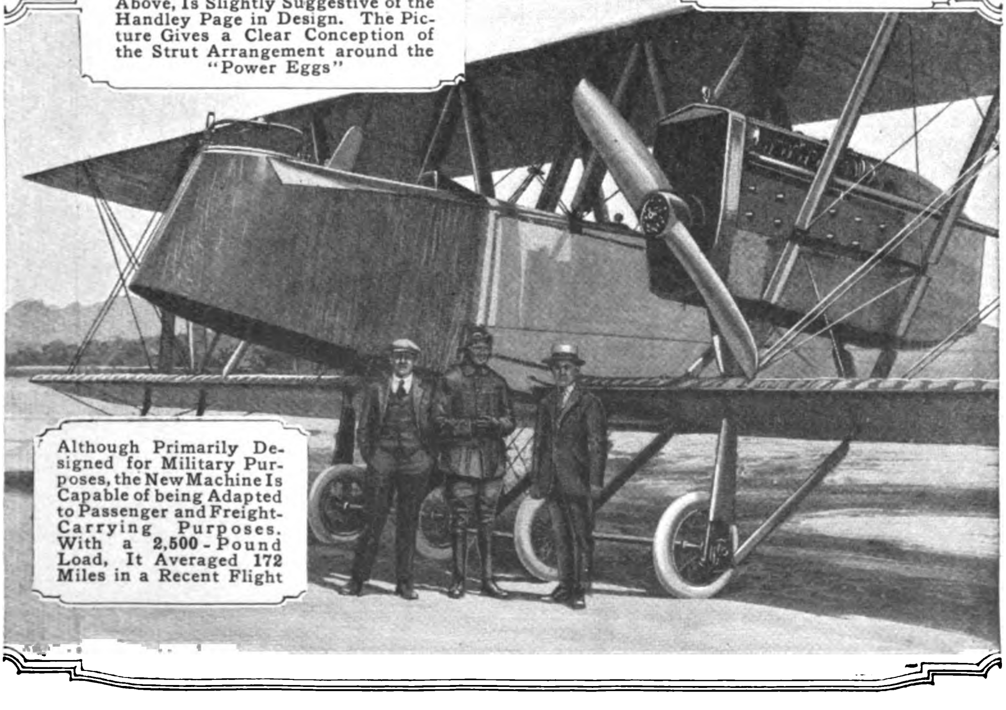


Both the Double Rudder and the Ailerons on Top and Bottom Wings Are Visible in This Rear View of the Fast Battleplane. It will be Observed That the Machine Is of Noticeably Lighter Construction Than the Handley Page, and, of Course, Also Smaller



The Bow of the Craft, as Shown Above, Is Slightly Suggestive of the Handley Page in Design. The Picture Gives a Clear Conception of the Strut Arrangement around the "Power Eggs"

In Flight the Plane Is Graceful and Nimble. It Responds Quickly to the Controls and Executes **"Acrobatics" with Unusual Ease for a Craft of Its Size**



Although Primarily Designed for Military Purposes, the New Machine Is Capable of being Adapted to Passenger and Freight-Carrying Purposes. With a 2,500-Pound Load, It Averaged 172 Miles in a Recent Flight

TORPEDO-CARRYING PLANE OF BRITISH DESIGN

Dropping a torpedo of the usual naval design from a flying airship, instead of shooting it from the tube of a torpedo boat—an idea that the British war department put into practical shape just before the signing of the armistice—cheated the Huns of a new experience. The 150-mile headway of the plane provides the initial energy for starting the torpedo on its course, the plane flying straight toward the enemy object, at a 50-ft. elevation, as it lets go its formidable underwater projectile. The special problems solved were overcoming the dangerous reaction of the plane, suddenly lightened by its loss of a ton weight. and the tendency of the torpedo to strike the water at an angle. Both these actions were disastrous in early experiments. Twenty of these torpedo planes, on a mother ship, guarded the surrender of the German fleet.

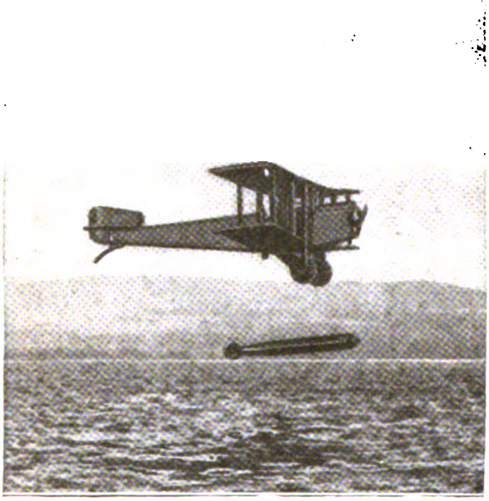


PHOTO BY DAILY MIRROR

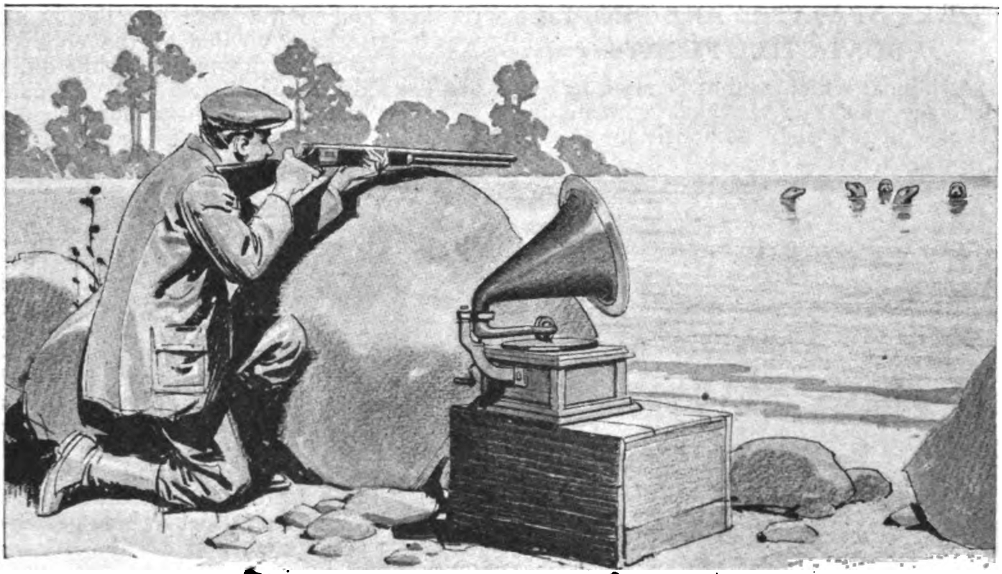
This British Torpedo-Carrying Airplane has Just Released Its Weapon, Which the Camera Caught Before It Entered the Water

SIBERIAN FUR DEALERS SEEK AMERICAN MARKETS

The turmoil in Russia having practically closed the Trans-Siberian Railway for trade purposes, fur dealers in Siberia are now endeavoring to get in direct touch with American and British markets. Before the war they had built up a large business with firms in central Europe, which is now disorganized. Reports coming to this country from dealers in far-off northern Asia tell of fur trapping by natives on a scale the magnitude of which few Americans realize. Siberia being practically cut off from territory to the west, the fur trade of the whole region, it is said, is now being concentrated in Manchuria.

BY COURTESY OF THE FUR TRADE REVIEW

A Fur Trader and His Employes in Manchuria, China, Inspecting a Shipment of Goods Received from Mongolia: The Man Standing Third from the Right is Examining a Large Fox Skin



PHONOGRAPH LURES SEALS WITHIN RANGE OF HUNTER'S GUN

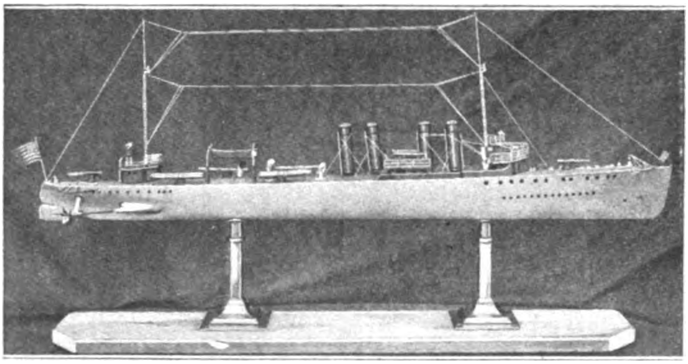
KILLING seals enticed within gun range by a phonograph is the unusual practice which a hunter, frequenting waters bordering the states of the Pacific Northwest, has found very profitable. The instrument, which is of a size that can be easily carried about, is set up near the rendezvous of the animals, and soon its music attracts their attention, and they lift their heads well above the water. The hunter reports that he has been able to shoot large numbers of them while they are under the spell of the sounds so strange to their ears.

NEW MATERIAL FOR MAKING ARTIFICIAL LIMBS

Several advantages, among which is decidedly lower cost, are claimed for a celluloid substitute used in making artificial limbs. This substance is prepared by mixing equal parts of water with a certain make of glue, producing a cement which is applied to muslin in the same manner as when making celluloid arm and leg appliances, namely, while winding it about a plaster cast. The substitute is said to be light, strong, and noninflammable.

¶A tax of two cents a head on all cattle and sheep in Natrona County, Wyo., producing a fund of $6,000 to $8,000, will be used for the eradication of coyotes, wolves, bobcats, and other predatory animals, under the supervision of the United States Biological Survey.

SHIPBUILDERS GIVE EMPLOYER MINIATURE DESTROYER

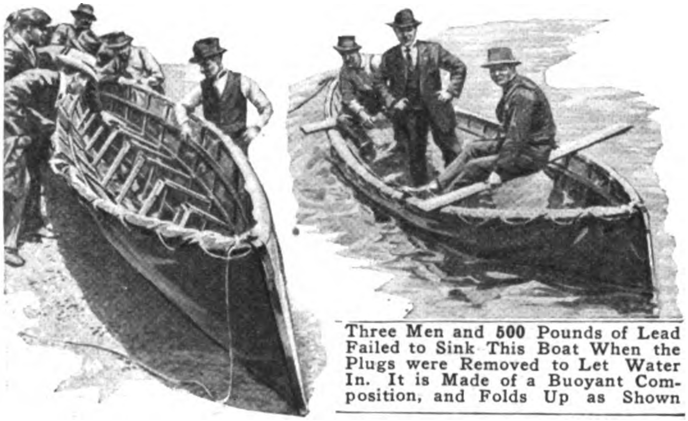


Model of a Destroyer, Approximately 40 Inches Long, Made by Workers in an Eastern Shipyard and Presented to an Official of the Company: Every External Feature of the Original has been Faithfully Reproduced on a Scale of One-Eighth Inch to the Foot

A much-appreciated gift recently presented to an official of an eastern shipbuilding concern by his employes—a memento made by their own hands—is a 39¾-in. model of a destroyer. It was built on a scale of ⅛ in. to the foot, and every external detail of the original was reproduced with the greatest care.

FULL OF WATER AND PEOPLE BOAT STILL FLOATS

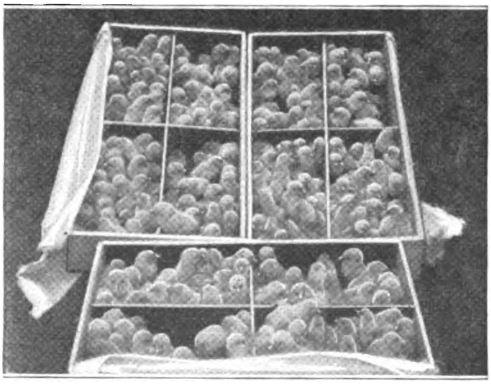
A lifeboat which cannot be sunk by any ordinary means is provided by fastening blocks of buoyant composition to the sides of a folding frame, making the boat collapsible for storage or shipment. The sides, of flexible material, are attached to the keel and to the stern and bowstems, which latter are pivoted at the ends of the keel to allow movement as the sides are expanded or collapsed. Folding spreader members hold the boat rigidly expanded and serve also as seats. They are locked, and released, by a quarter turn of a shaft extending through one end of the boat. All outside surfaces are covered with waterproof material, and the buoyant composition is put on in sections, for easy replacement or repair in case of damage. The whole is covered with canvas for protection. A test model with several plugged holes in the bottom was loaded with three passengers and 500 lb. of lead. When the plugs were withdrawn the boat filled with water and settled slightly, but a large portion of its bulk remained above the water line.



Three Men and 500 Pounds of Lead Failed to Sink This Boat When the Plugs were Removed to Let Water In. It is Made of a Buoyant Composition, and Folds Up as Shown

SHIP BABY CHICKS SAFELY, HUNDRED IN A BOX

Packing boxes for shipping baby chicks a day old are successfully being used by a New York State poultryman. The form of box used, devised after considerable experimenting, is divided by partitions into four compartments. Each compartment carries 25 chicks, or 100 to the box. Muslin tops tacked on give plenty of air and protection from draft, the partitions prevent crowding or smothering.

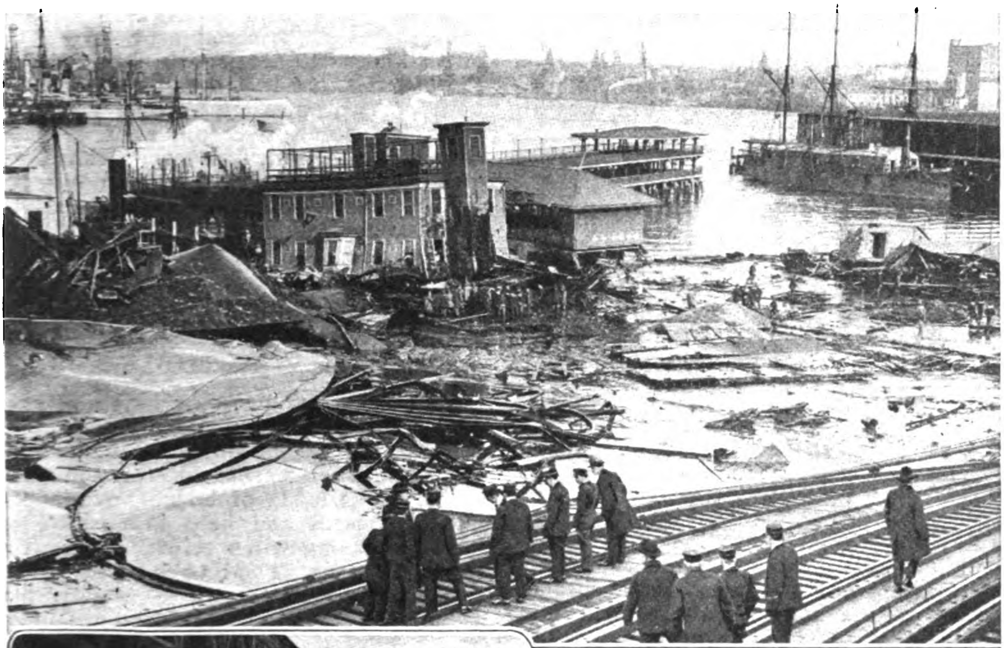


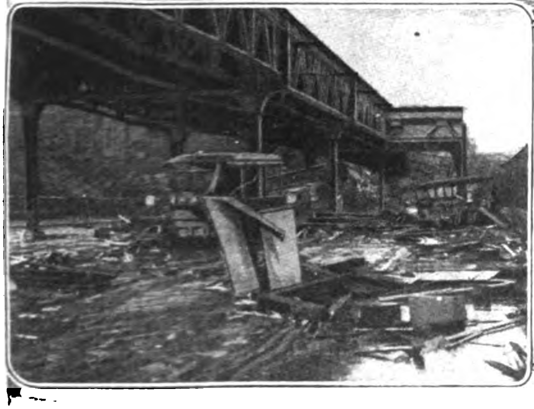
These Boxes, with Muslin Tacked on Top, are Used for Shipping Live Day-Old Chicks. The Partitions Prevent Crowding

BRITISH ARMY PLANS TO SELL VAST NUMBER OF HORSES

During the war little was said about the great numbers of horses—many of them prized English mounts—used by the armies in France, but now many interesting facts are being made public. Great Britain is planning to dispose of 750,000 horses, 700,000 of which were brought from North and South America, Spain, northern Africa, and elsewhere. Just how the sale of so many horses can be managed without bringing prices below actual values is something of a problem. In fact some Britishers, with characteristic humane regard for domestic animals, would prefer that all horses not brought back be killed rather than permitted to fall into the hands of persons who might treat them brutally. It is proposed to return at least 17 per cent of them to England—the equivalent of the number taken from that country. Doubtless many will be disposed of in Belgium and France. The losses among the horses were heavy, being 12 per cent for the last four months of 1914, approximately 14 per cent for both 1915 and 1916, and 28 per cent for 1917. Last year the losses were surprisingly small, amounting in the 10 months of war to only two and one-half per cent.

EXPLOSION OF MILLION-GALLON MOLASSES TANK





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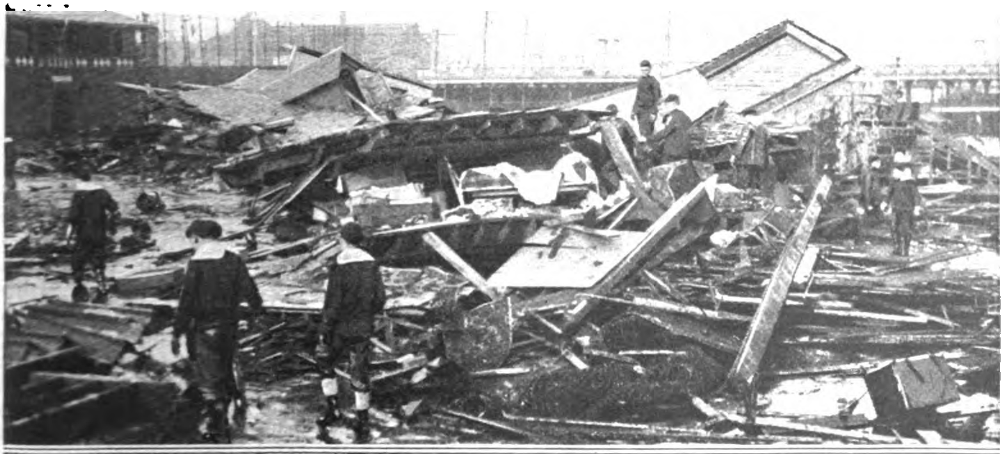
THE explosion of a huge molasses tank in a Boston freight yard utterly demolished several buildings, tore away two elevated-railway supporting pillars, blew an electric car off its track, and overturned a number of heavy trucks. The blast killed at least **10** persons outright and injured scores of others, many seriously. A dozen horses were killed. The capacity of the tank was upward of **1,000,000** gallons, and molasses spread over the street two or three inches deep, while the wreckage was covered with it. No violent detonation accompanied the explosion, but the walls of the buildings and other adjacent structures crumpled like paper. At the top of the page and to the left are seen the ruins of the freight yard and wreckage-littered street; below are sailors from the navy yard searching for victims.



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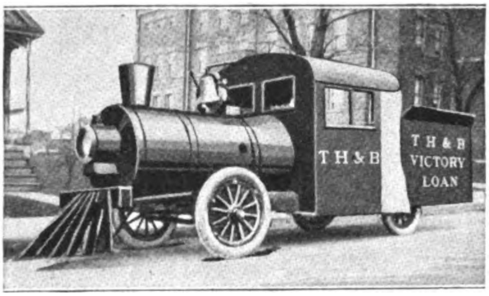
AUTO IN PATRIOTIC PARADE HAS LOCOMOTIVE BODY

One of the clever features in a parade recently held in Hamilton, Ont., to promote the Canadian Victory loan, was an automobile fitted up to look like a railway locomotive. The top and windshield were removed, and two heavy beams, bolted to the body, were extended 5 ft. to the rear to support the tender. The boiler and cab were of sheet iron. Angle irons were attached to the front of the car frame to carry the front end of the boiler, and special supports were placed beneath the bell which had formerly seen actual use on an engine. The float was entered by the Toronto, Hamilton, and Buffalo Railway Company.



An Out-of-the-Ordinary Feature in a Patriotic Parade in Hamilton, Ontario: The Imitation Locomotive is Made Largely of Sheet Iron and is Supported by a Wood and Iron Framework Inclosing the Hidden Automobile

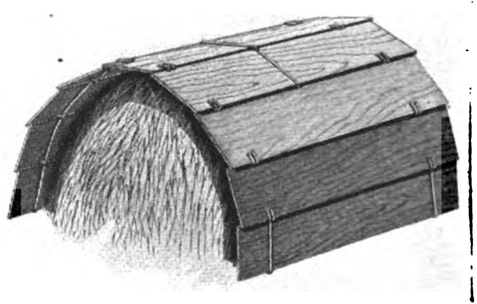
BLAST DITCH THROUGH ROCK TO DRAIN FARM

For the purpose of draining an area of muck land, used for growing vegetables, a ditch half a mile long was blasted through solid limestone in Wayne County, New York. The cost of the improvement, amounting to about $5,000, was met by the coöperation of the farmers benefited. So much limestone débris was produced by the blasting that it had to be piled along both banks of the ditch by a derrick. The ditch lies along the course of a small stream, which, with its capacity thus augmented, is able to keep freshets from flooding the peat soil of the farms, and so adds a considerable area of usable and fertile land to the local vegetable-growing district.

Limestone Was No Barrier to the Vegetable Farmers of Wayne County, New York, Who Blasted This Drainage Ditch to Keep Floods Off Their Muck Land

SUBSTANTIAL STACK ROOF EASILY ASSEMBLED

A covering for grain or haystacks, recently patented, can be easily assembled without the use of hooks or nails, and, when not in service, can be stored in small space. It is made of boards, overlapped like clapboards and held in position by hooks engaging wires stretched over the top of the stack. The hooks for one board are so placed that the board below supports them, the bottom board on either side being held by the wires looped about it. Means can be provided for tying the roof down so that the wind cannot lift it.



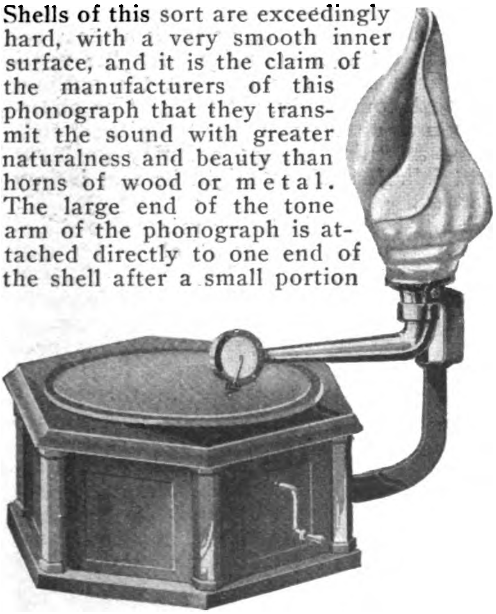
Roof for Peak of Hay and Grain Stacks Which can be Assembled without Employing Hammer and Nails: When Not in Use It can be Stored in Small Space

ZEPPELIN CAN CARRY CARGO ACROSS ATLANTIC, BELIEF

In the opinion of American aeronautical authorities, there is good reason to have faith in the ability of German super-Zeppelins to carry commercial cargoes between Hamburg and New York in accordance with the reported plans of certain Hun interests. Without discussing the rumored project from other than the standpoint of aviation, attention is called to the fact that, according to information deemed authentic, the latest German rigid dirigibles are about 800 ft. long and hold some 3,000,000 cu. ft. of gas. Driven by multiple engines of great horsepower, they travel, conditions being normal, at a speed of 70 or 80 miles an hour. It is asserted that Zeppelins of this type are able to remain in the air for as long as two weeks without material loss of gas. Furthermore, they are understood to be capable of carrying a useful load of approximately 30 tons. During the war a Zeppelin with 22 men and 25 tons of munitions aboard is claimed to have made a 1,000-mile nonstop flight. On the other hand, the statement is made in a committee report of the air board that dirigibles of more than 4,000 mile range are in existence.

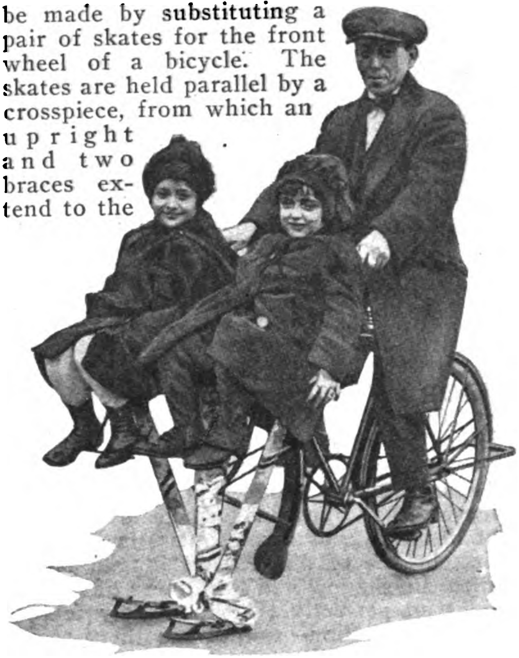
USE CONCH SHELLS AS HORNS FOR PHONOGRAPHS

A feature which makes a new phonograph different from all others is the use of a conch shell for the horn. Shells of this sort are exceedingly hard, with a very smooth inner surface, and it is the claim of the manufacturers of this phonograph that they transmit the sound with greater naturalness and beauty than horns of wood or metal. The large end of the tone arm of the phonograph is attached directly to one end of the shell after a small portion of the latter has been cut off. With a small instrument having an outside horn, the shell stands on end, the sound issuing from the opening in the side. In the case of instruments having concealed horns, the shells are installed at the back of the conical passage from which the sound issues.


The Unusual Horn on This Phonograph Is a Conch Shell, Which, the Makers Claim, Gives the Instrument Exceptional Tone Qualities

ICE CYCLE HAS TWO SKATES INSTEAD OF FRONT WHEEL

An ingenious New York man recently demonstrated that a speedy ice craft can be made by substituting a pair of skates for the front wheel of a bicycle. The skates are held parallel by a crosspiece, from which an upright and two braces extend to the front of the frame. The braces support two small front seats, with foot rests, in which the rider carries two of his little friends. The owner calls his vehicle an "icicle."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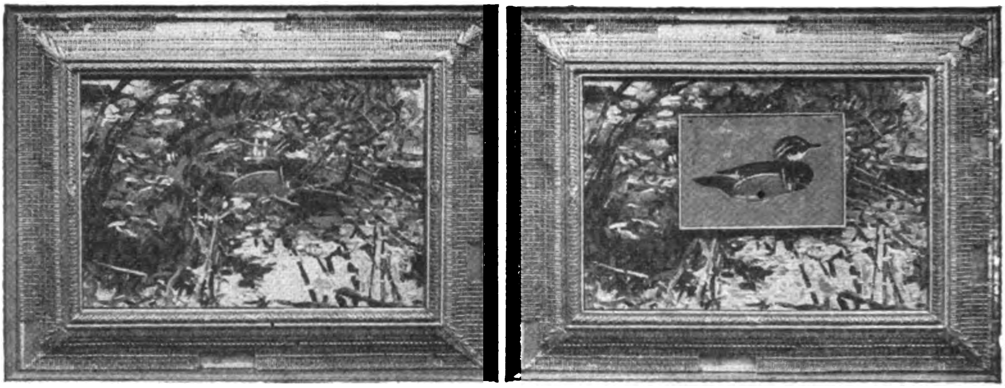
A Vehicle for Winter Sport Which the Maker has Nicknamed an "Icicle": It is Steered with the Handlebars Like a Bicycle

WARSHIPS TO CARRY MAIL, SWEDISH PEACE IDEA

Removing their side armor, protective decks, barbettes, and guns would change battle cruisers into fine mail liners with plenty of room for passengers. That is the proposal which has the approval of the Swedish minister of marine for application to the Swedish navy's two largest warships. The vessels so pacificated would have 2,000 tons dead-weight capacity with a displacement of 4,300 tons and a speed of 25 to 30 miles an hour. Sweden's navy numbers 69 war craft of all kinds, all of which are well designed and constructed, but rather small for actual war purposes. This appears to be the first serious indication of a possible peaceful use for naval units.



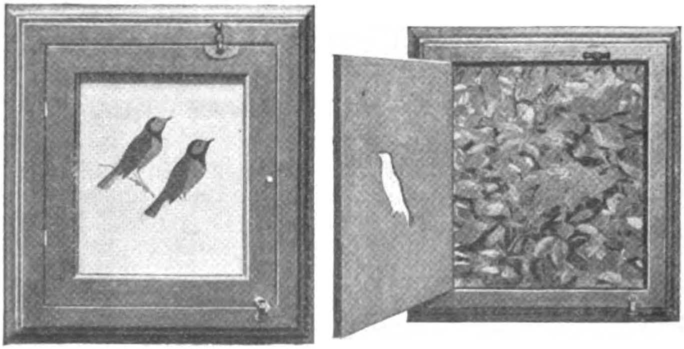
First, Look at the Picture at the Left. It Is an Oil Sketch of a Male Wood Duck at the Border of a Pool amid Vegetation. Failing to Find the Fowl, Look at the Right Picture, over Which a Stenciled Mat has been Placed to Separate the Bird from Its Camouflaging Surroundings

A NEW CAMOUFLAGE ART

By BRANDON TRACY

FOR many years scientists have known that nature has endowed most wild animals with deceptive coloration for the purpose of concealment from enemies. When snugly ensconced in a bed of dried leaves, the copperhead snake is invisible at 10 feet. Zebras, motionless in the sapling brakes of an African jungle, blend with the shadow and brightness of moonlight so perfectly that their only feared enemy—the lion—cannot see them at 30 feet. The wood duck, resting in a baylet with her tiny brood, eludes the hawk because her color scheme matches her surroundings perfectly.

At the Art Institute, Chicago, recently was given an exhibition of paintings of nature subjects based upon these facts. The pictures, done by Abbott H. Thayer, Gladys Thayer, Gerald H. Thayer, Louis Agassiz Fuertes, and Richard S. Meryman, demonstrate all angles of nature's use of camouflage. The simplest form of this art showed a peacock standing on a stone garden wall amid ivy and tree foliage. The head and neck of the bird is silhouetted against the sky, but the gorgeous plumage—which in another setting would make the peacock a most remarkable target—mingles with the vegetation in such manner that the outlines are lost completely. It takes close observation to distinguish that the picture contains anything except ordinary greenery and foliage such as might be met in any garden.



Of the Two Images of Hooded Warblers at the Left, One Is a Water Color and the Other a Stenciled Silhouette That Makes Visible the Bird in the Picture Concealed beneath the Screen. At the Right the Screen has been Opened, Disclosing the Sunlit Foliage, amid Which the Little Creature is Posed

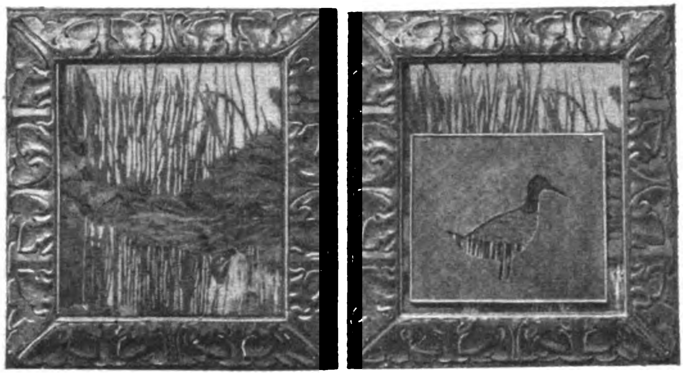
The observer instantly raises the objection, "Oh, but the artist chose his colors and arrangement. No wonder the bird is concealed!" The new school is ready for just that criticism.

The "rebuttal" is presented in the form of a landscape in the Himalaya Mountains, a picture showing the snow-capped peaks in the distance against blue sky. In the foreground is underbrush, a spiring evergreen tree, and other vegetation. The whole picture is made, not with oils or water colors, but from the feathers of the male monal pheasant! This most brilliant of feathered creatures is the animal above all others one would least expect to own protective coloring, but the artist shows that the pigments its plumage furnishes are identical with those given by nature to the landscape it graces. When free in this country of mountains it is next to indistinguishable by the eye.

Right in line with the same idea is the picture shown with this article, "Hooded Warbler and Sunlit Foliage." In looking at the unstenciled picture, the observer sees nothing but an array of foliage, played upon by sunlight and shadow. No warbler has been painted in, although this is exactly his habitat.

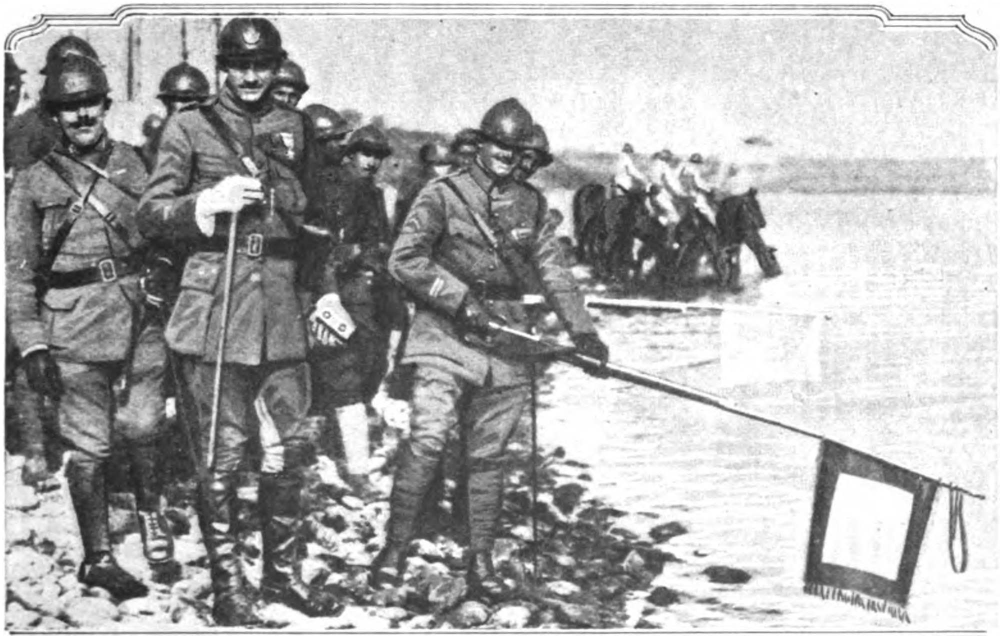
A cover fits over the painting. In this cover is cut a stencil exactly on the outlines of the warbler. As the observer closes the cover he sees through the stencil a perfect likeness of the warbler, which he can compare, if he chooses, with a sketch from life on the outside of the cover.

This is, naturally, something of a trick picture. It simply reinforces the fact that in the habitat of these birds are all of the brilliant colors of the plumage. The artist has arranged the leaves and chiaroscuro of the painting so the observer cannot mistake the lesson at first glance.



At the Left is Presented a Painting of a Reed-Bordered Pool in the Marshes. It Includes No Image of a Bird, yet by Applying a Stenciled Mat, as at the Right, an Excellent Representation of a Swamp-Dwelling Railbird can be Seen

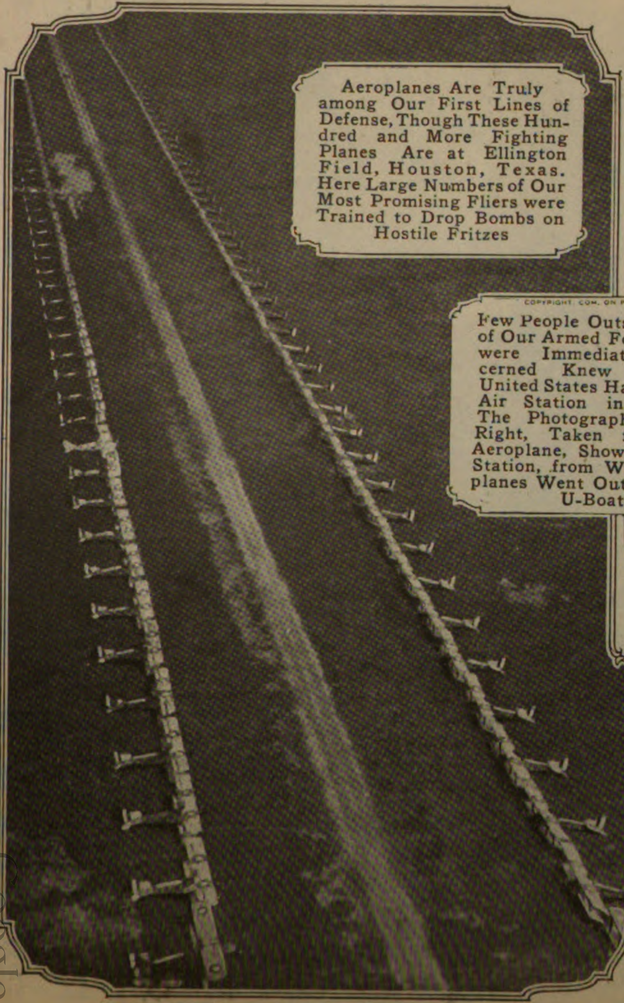
Camouflage, as used by military forces in the war, was based entirely upon lessons learned from these birds and animals. Man's work in this direction still lacks much, for nature approximates perfection.



FRENCH MOROCCAN TROOPS INAUGURATING THEIR "WATCH ON THE RHINE"

ONE of the many incidents of interest that attended the advance of French forces into Germany, in accordance with the armistice terms, is illustrated by the photograph reproduced herewith. It shows a regimental standard bearer, surrounded by officers and men, dipping a banner in the waters of the Rhine, an act symbolizing the fact that this particular part of the mighty river is under the control of the victors.

WITH OUR AIR FORCES AT HOME AND IN IRELAND



Aeroplanes Are Truly among Our First Lines of Defense, Though These Hundred and More Fighting Planes Are at Ellington Field, Houston, Texas. Here Large Numbers of Our Most Promising Fliers were Trained to Drop Bombs on Hostile Fritzes

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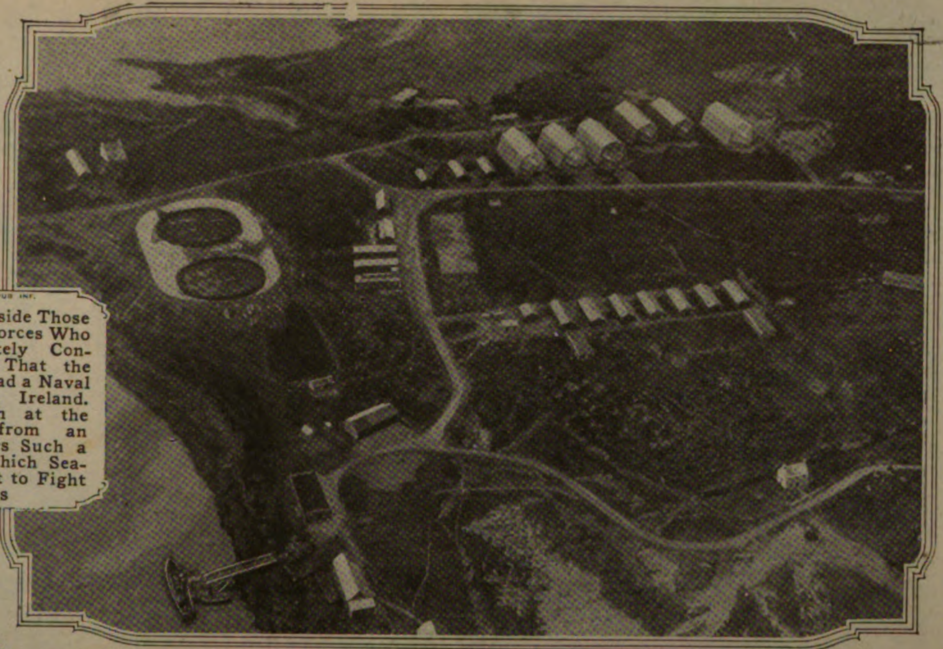
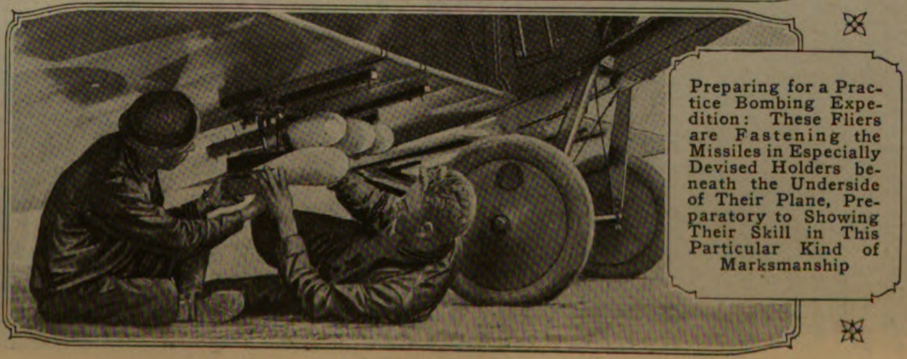
Few People Outside Those of Our Armed Forces Who were Immediately Concerned Knew That the United States Had a Naval Air Station in Ireland. The Photograph at the Right, Taken from an Aeroplane, Shows Such a Station, from Which Seaplanes Went Out to Fight U-Boats

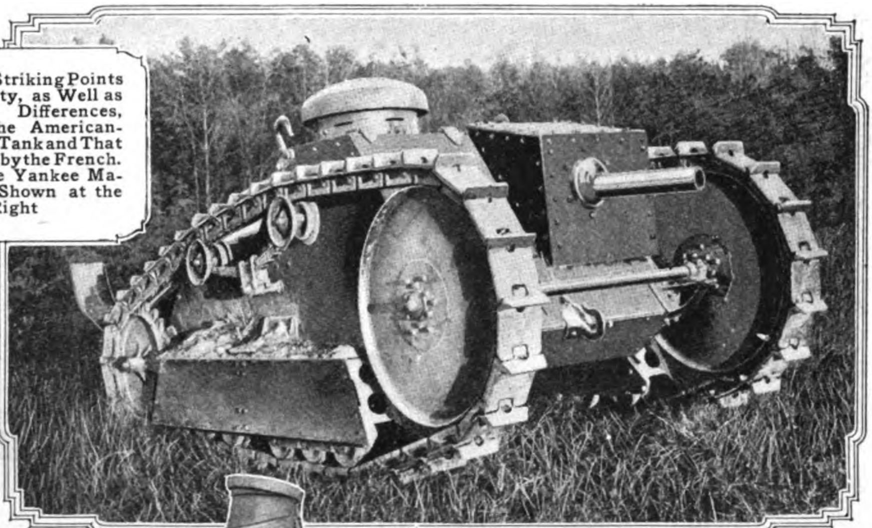


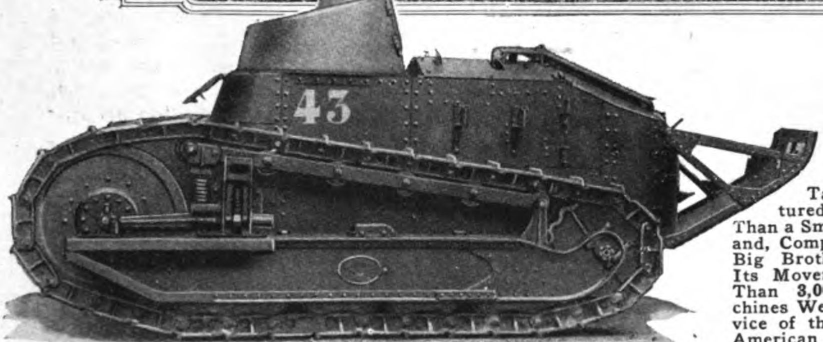


Preparing for a Practice Bombing Expedition: These Fliers are Fastening the Missiles in Especially Devised Holders beneath the Underside of Their Plane, Preparatory to Showing Their Skill in This Particular Kind of Marksmanship

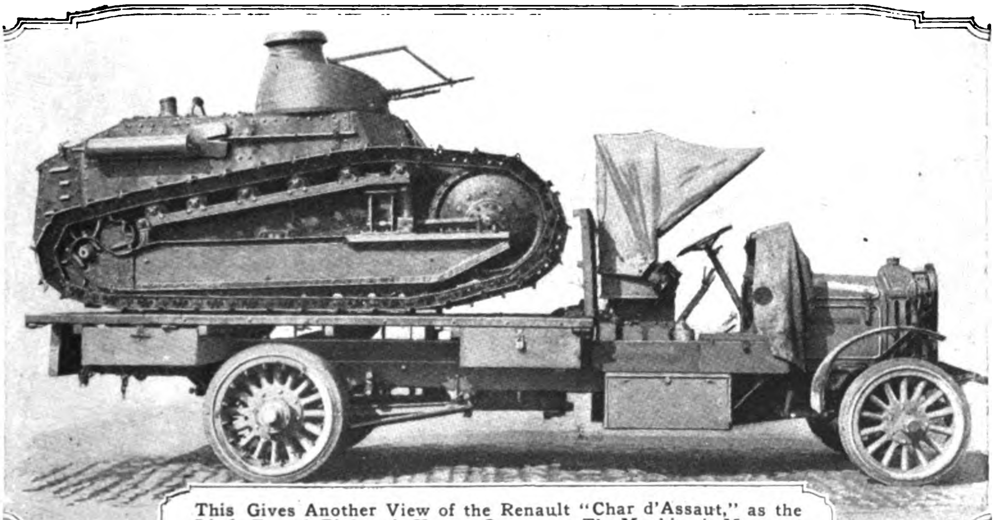
CLOSE-UPS OF FRENCH AND YANK BABY TANKS

There Are Striking Points of Similarity, as Well as Noticeable Differences, between the American-Built Baby Tank and That Developed by the French. One of the Yankee Machines is Shown at the Right



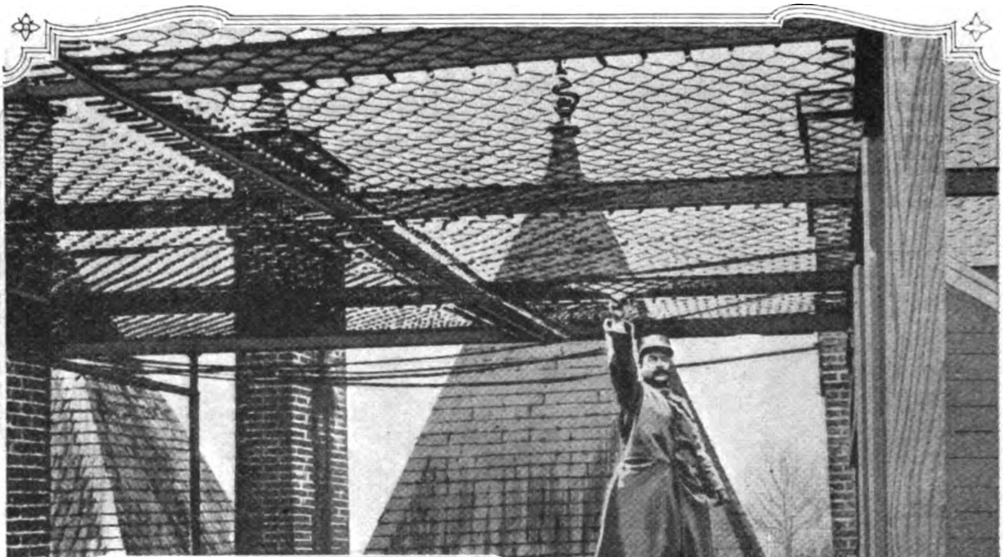


The French Baby Tank, Here Pictured, Is No Larger Than a Small Motor Car, and, Compared with Its Big Brother, Quick in Its Movements. More Than 3,000 Such Machines Were in the Service of the French and American Armies When Hostilities Ceased, According to Reports



This Gives Another View of the Renault "Char d'Assaut," as the Little French Fighter is Known Overseas. The Machine is Mounted on an American Motor Truck, and This, Incidentally, Explains How Quick Transportation of the Tanks from One Position to Another was Accomplished

GERMAN NEWS PICTURES OF TIMELY INTEREST



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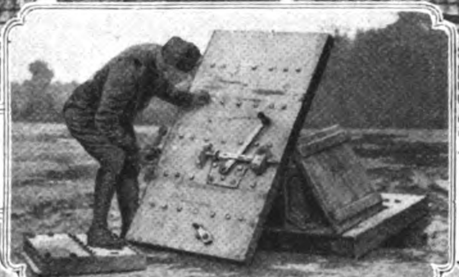
To Protect the Former Crown Prince of Germany from Aerial Bombs, This Spring-Held Metal Screen was Erected above the Roof of the Villa Renaudin, Which Served as His Headquarters in the Vicinity of Charleville

FRENCH OFFICIAL PHOTO



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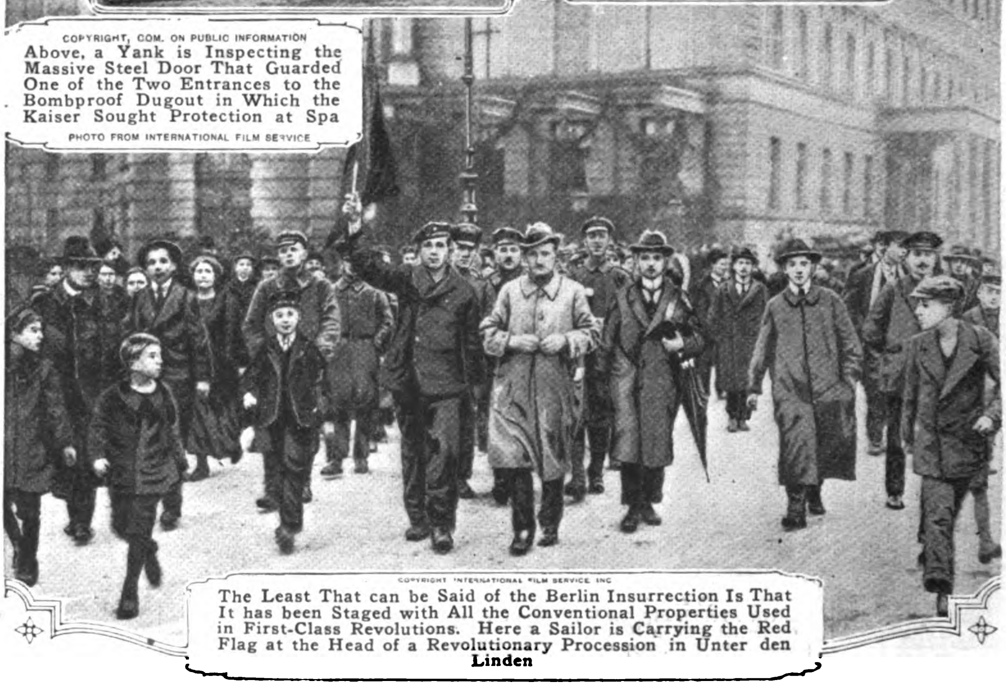
Above, a Yank is Inspecting the Massive Steel Door That Guarded One of the Two Entrances to the Bombproof Dugout in Which the Kaiser Sought Protection at Spa

PHOTO FROM INTERNATIONAL FILM SERVICE



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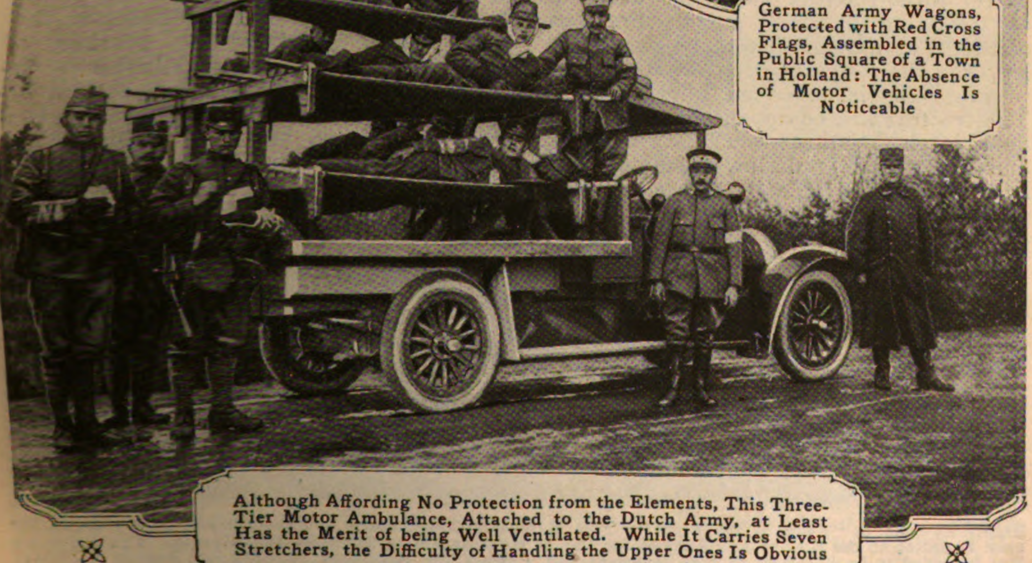
The Least That can be Said of the Berlin Insurrection Is That It has been Staged with All the Conventional Properties Used in First-Class Revolutions. Here a Sailor is Carrying the Red Flag at the Head of a Revolutionary Procession in Unter den Linden

RETIRING HUNS CROSS FRONTIER INTO HOLLAND

The Photograph Reproduced Above Shows a Long Column of German Army-Supply Wagons Trekking through a Dutch Village After Crossing the Border from Belgium, Following the Armistice Agreement

German Army Wagons, Protected with Red Cross Flags, Assembled in the Public Square of a Town in Holland: The Absence of Motor Vehicles Is Noticeable



Although Affording No Protection from the Elements, This Three-Tier Motor Ambulance, Attached to the Dutch Army, at Least Has the Merit of being Well Ventilated. While It Carries Seven Stretchers, the Difficulty of Handling the Upper Ones Is Obvious

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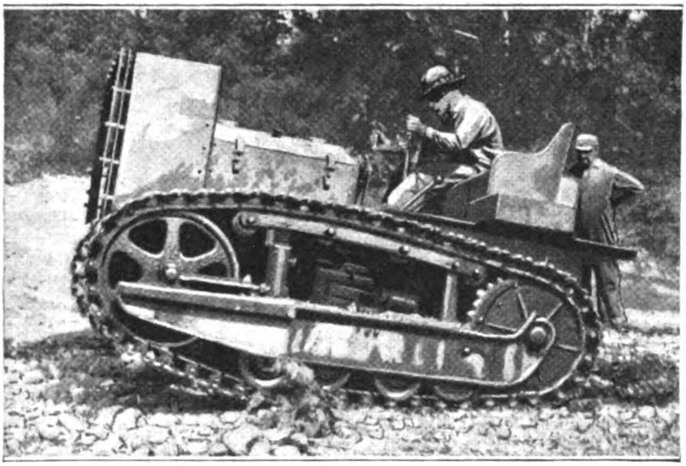
FAST TRACTORS HAUL TANKS TO SPEED ARMY DRIVE

Tractors of the 2½-ton type, equipped with eight-cylinder engines of standard make, were used in the last allied-army drive to reduce road congestion by virtue of their relatively high speed. They were able to haul spring trailers at a steady gait of 14 miles an hour, with a maximum speed of 17. Small tanks of the "whippet" type were frequently placed on these trailers for hauling, facilitating their movement from point to point. By towing 75-mm. field guns on trailers, these useful little tractors aided the army in consolidating its daily gains. Previous methods of moving the tanks and artillery on their own wheels limited their progress to six miles an hour, or less. The tractors are equipped with multiple-disk clutch and three-speed transmission, and the engine, radiator, gasoline tank, and other vulnerable parts are inclosed in armor sufficiently stout to resist machine-gun fire or flying pieces of shrapnel.



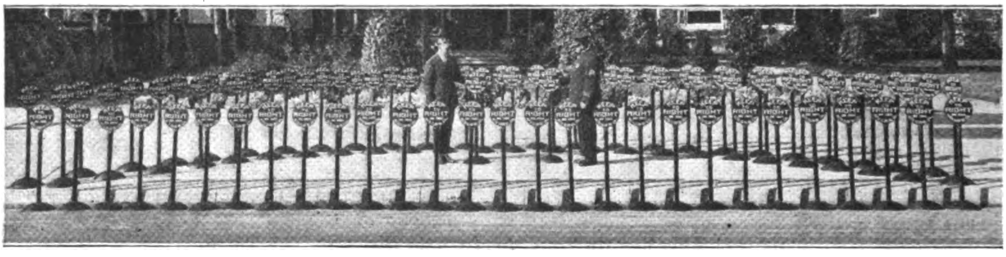
This 2½-Ton Artillery Tractor Has an Eight-Cylinder Engine and can Do 14 to 17 Miles an Hour Hauling a Trailer Loaded with a Small Tank or a "75" Gun

AMERICAN GIRLS RUN SHOPS ON CARS IN FRANCE

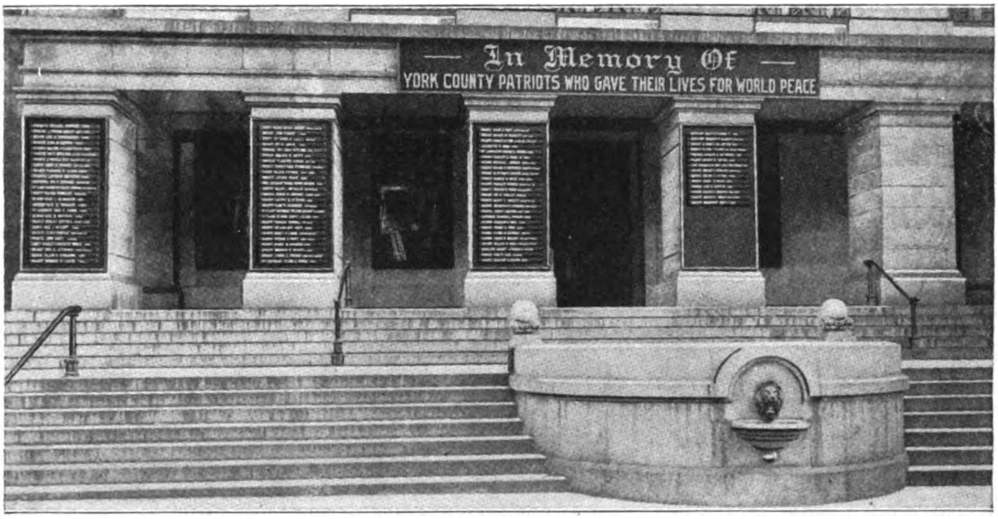
Peddling brought up to the minute is a feature of the devastated settlements of northern France. American girls are driving small automobiles over the almost impassable roads, dealing out the necessities of life to the inhabitants of ruins and cellars, whose former accessibility by railroad has gone the way of other ordinary conveniences in that wrecked district. The cars are stocked with the commodities that experience dictates, so that, besides coffee, lard, cocoa, canned meats, condensed milk, and other groceries, it has been found desirable to carry blankets, sheets, pots and tin plates, knives, lamps, brooms, pins, and soap. A driver and saleswoman, working from dawn to dark, can satisfy the more urgent requirements of 50 villages a week.

EIGHTY TRAFFIC SIGNS TO PROMOTE SAFETY

As evidence of its desire to aid in preventing automobile accidents, a local club of motorists has furnished the city of Los Angeles with 80 metal "Keep-to-the-Right" signs to be used as markers of safety zones in the streets, displacing articles of a similar character that had become badly damaged. Each of these new signs has a heavy metal base into which is threaded a 2-in. pipe. This standard is flattened at its upper end and to it is attached a red disk on which the legend is lettered in white.



Eighty Appeals to "Keep to the Right": This Extensive Consignment of Substantially Made Signs has been Supplied to the City of Los Angeles for Use in Marking Safety Zones in the Streets. The Signs are Not Intended to be Fastened to the Pavement but Possess the Necessary Stability by Reason of Heavy Metal Bases



A Fitting Recognition of Departed Soldiers' Patriotism: The Entrance to the County Courthouse at York, Pennsylvania, Showing the Names of the County's Dead Heroes Inscribed on Panels Attached to the Pillars

COUNTY HONORS DEAD HEROES AT COURTHOUSE ENTRANCE

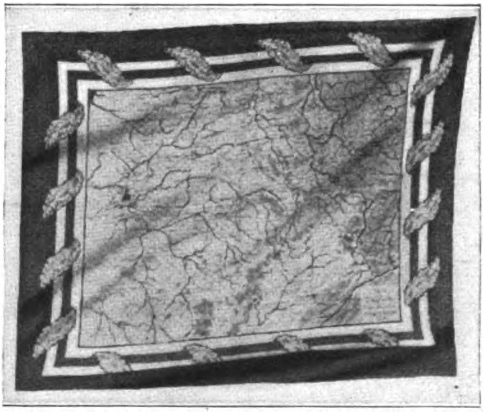
Signal honor has been accorded to the memory of approximately 150 men from York County, Pa., who died in the great war, by inscribing their names on panels covering the front of pillars at the entrance to the county courthouse. An appropriate legend occupies the space above this list. The name of each man, together with his former residence, is lettered in gold on an individual blackboard, which in turn is mounted on one of several black panels. At the time the accompanying photograph was taken the roll of dead had not been completed, but additional data at hand showed that the total would exceed 150—enough to cover the fronts of all the pillars and some space on the sides. The memorial was erected under the auspices of the local chamber of commerce.

CROWDED CABLES TO EUROPE RELIEVED BY RADIO

Wireless—scientific wonder a few years since—now takes its prosaic place as official aid to overburdened Atlantic cables. Government cable messages addressed to Europe are likely to be routed via wireless by the cable companies unless specifically marked "not to be sent by radio." This is particularly true of messages not of a confidential nature. Our increasing intimacy with the other side, threatening to load the cable lines beyond their capacity, led to the service-facilitating order by the postmaster-general to substitute radio when the circumstances made it feasible to do so.

MAP OF WAR ZONE PRINTED ON GERMAN HANDKERCHIEF

Among the much-prized mementoes of the great war possessed by an American doughboy is a large silk handkerchief which was obtained from a captured German officer. On it is printed a detailed map of the western front and adjoining territory. The texture of the handkerchief is such that it can be carried in the pocket without danger of cracking it.



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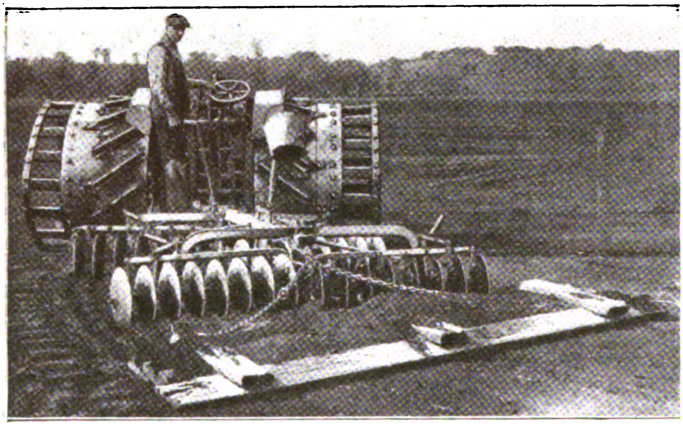
A Doughboy's Trophy Captured from a German Officer: The Map is Printed on a Silk Handkerchief and, Folded, Occupies Very Little Space

EXTENSIONS TO TIRES EQUIP TRACTOR FOR SOFT SOIL

That a heavy farm tractor might be used in cultivating a large field of soggy land, extensions for the drivewheel rims were devised which made the machine practically as efficient on soft ground as those especially equipped with wheels having extra-wide treads. The extensions were fastened to the outer edge of the rims of the drivewheels, doubling their width. They consisted of a broad and a narrow hoop, placed about 12 in. apart and held in place by crosspieces set at intervals of five or six inches.



Farm Tractor with Extensions Attached to the Tires of the Drivewheels Which Enabled It to be Used in Preparing Soggy Soil for Planting: The Track at the Left Shows That the Machine has Scarcely Sunk into the Ground at All

WAR-STAMP BOOTHS EQUIPPED WITH "LIBERTY BELLS"

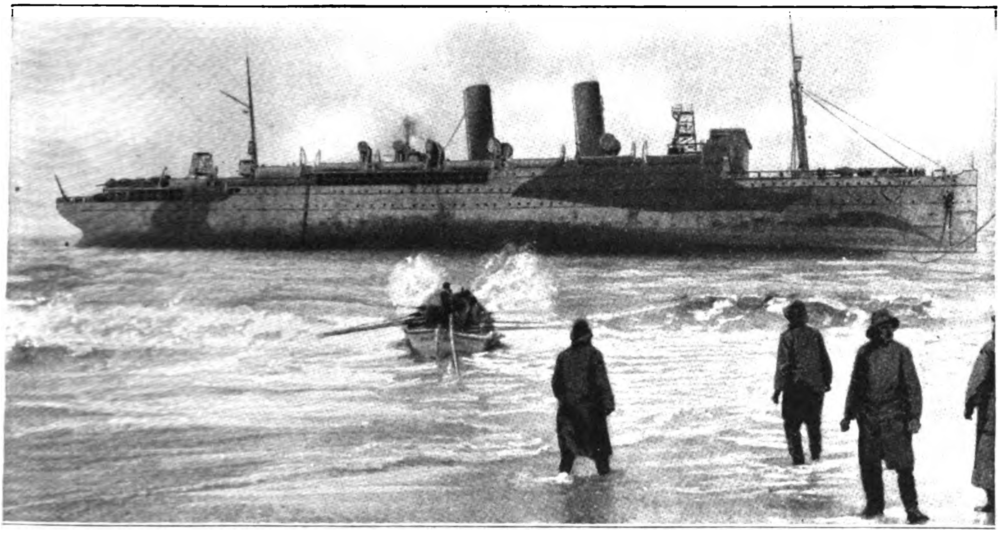
The privilege of ringing a miniature Liberty Bell, which was accorded each purchaser of war-savings stamps during a recent "drive" in Los Angeles, proved a great stimulus to the campaign. There were 60 of these bells, painted to represent the prized relic in Philadelphia, which were mounted above as many tents scattered throughout the business district. Each ringing of a bell told the crowds in the streets that another purchase of stamps had been made.

INVESTIGATORS STUDY TWIST DRILLS OF MANY TYPES

An exhaustive investigation conducted by the engineering experiment station of the University of Illinois, at Urbana, has determined more definitely than has ever been done before the relative merits of various types of twist drills. A report of this research work, fully illustrated, has been issued by the university. It contains valuable comment on many important aspects of the problem under consideration, including such questions as the power required at the drill point for various speeds, and the endurance of different drills under a variety of conditions. Special apparatus had to be designed for some of the work. This investigation is the first of several relating to metal-cutting tools that have been planned by the experiment station of the school.

CAVERN IN FRANCE REVEALS PREHISTORIC ART

Stone engravings whose antiquity is estimated at 30,000 years have been discovered in an extensive cavern at Montesqui-Avantes, at the foot of the Pyrenees in Ariège, southern France. These ancient pictures appear on the walls of the cave in great profusion and variety, as though the subterranean galleries were once an actual museum of art. Most interesting, perhaps, is a figure in silhouette with human head, body and limbs, hands and feet, an enormous neck, and a caudal appendage like that of the apes, represented as walking on all fours. Delineations of animals include horses, single and in groups; reindeer, bisons, bears, elephants, and even a lion in bas-relief—an unusual subject in prehistoric art, Swans, ducks, nocturnal birds of prey, and other fliers are also represented. The explorations in the cavern which unearthed this art gallery of antiquity were conducted by a French count and his three sons during the brief furloughs of the latter, who were very active at the front and frequently cited in army dispatches.



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Coast-Guard Lifeboat Making for the Stricken Transport: At the Right the Hawser of the Breeches Buoy Is Visible. Although the Storm was Subsiding, the Camera Is Also Responsible for the Tame Appearance of the Sea

RESCUE STRANDED TROOPSHIP'S WOUNDED IN HEAVY STORM

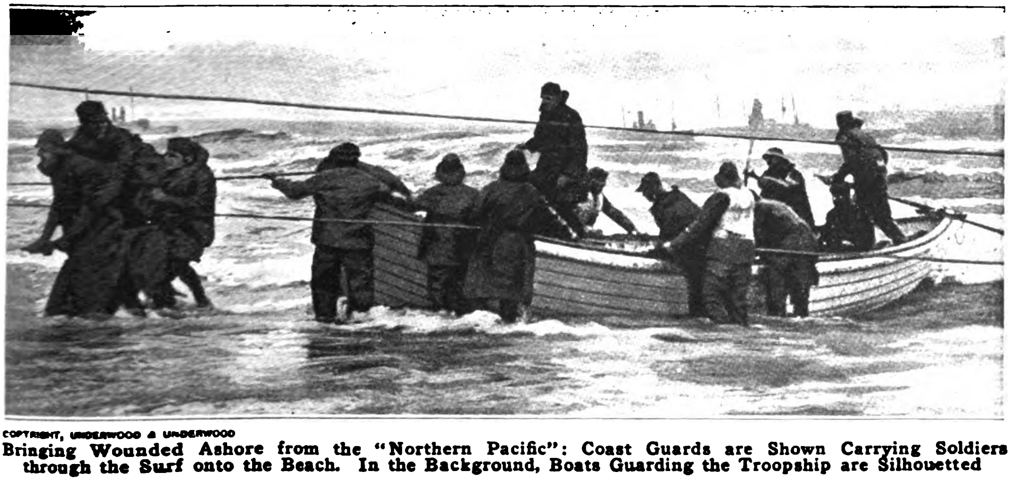
By SEARLE HENDEE

BUT for a shifting wind, a tragic record of disaster probably would have been written on the first page of America's register for 1919.

It is doubtful if the annals of United States shipping contain an account of offshore rescue work that parallels that accomplished after the troop transport "Northern Pacific," picking its way to New York harbor through a dense fog and furious sea before dawn New Year's morning, grounded on the outer bar some 600 yards off Fire Island beach.

Aboard the palatial liner were some 2,500 homeward-bound soldiers, 1,734 of whom were wounded veterans of the Argonne. Of the latter, approximately 300 were stretcher cases, while a number of others were shell-shock patients. One gallant fellow, with neither legs nor arms, was aboard. All were removed without loss of a single life.

Since the days of square-rigged frigates, Fire Island in a storm has been the dread of mariners and the graveyard of ships. Its name is derived from the bonfires that in early years were built to warn seamen of its danger. The "Northern Pacific"



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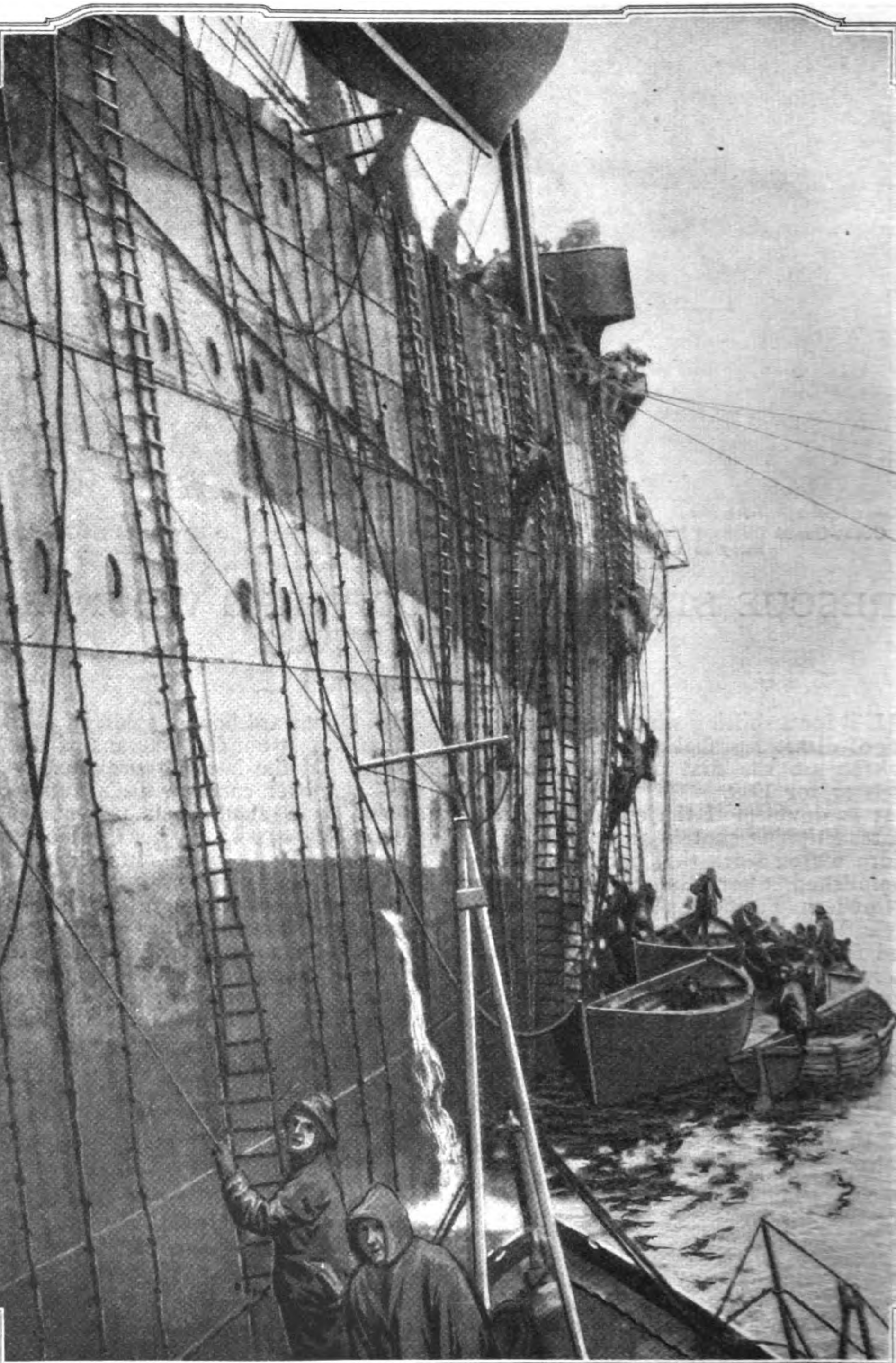
Bringing Wounded Ashore from the "Northern Pacific": Coast Guards are Shown Carrying Soldiers through the Surf onto the Beach. In the Background, Boats Guarding the Troopship are Silhouetted



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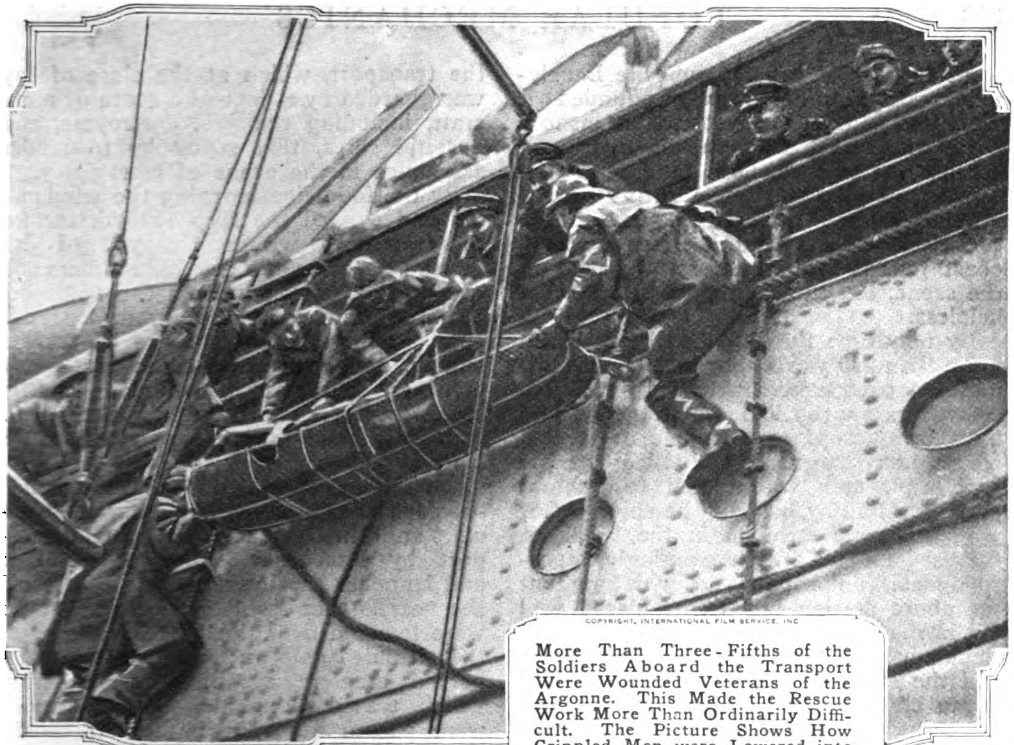
On the Third Day, Rope Ladders were Lowered over the Starboard Bow of the Stranded Ship to Enable Able-Bodied Soldiers to Reach the Rescue Craft Alongside. All but Some 200 of the Seriously Wounded Men were Removed before Nightfall. The Picture Above Shows Several Khaki-Clad Figures Descending the Ladders to Waiting Boats



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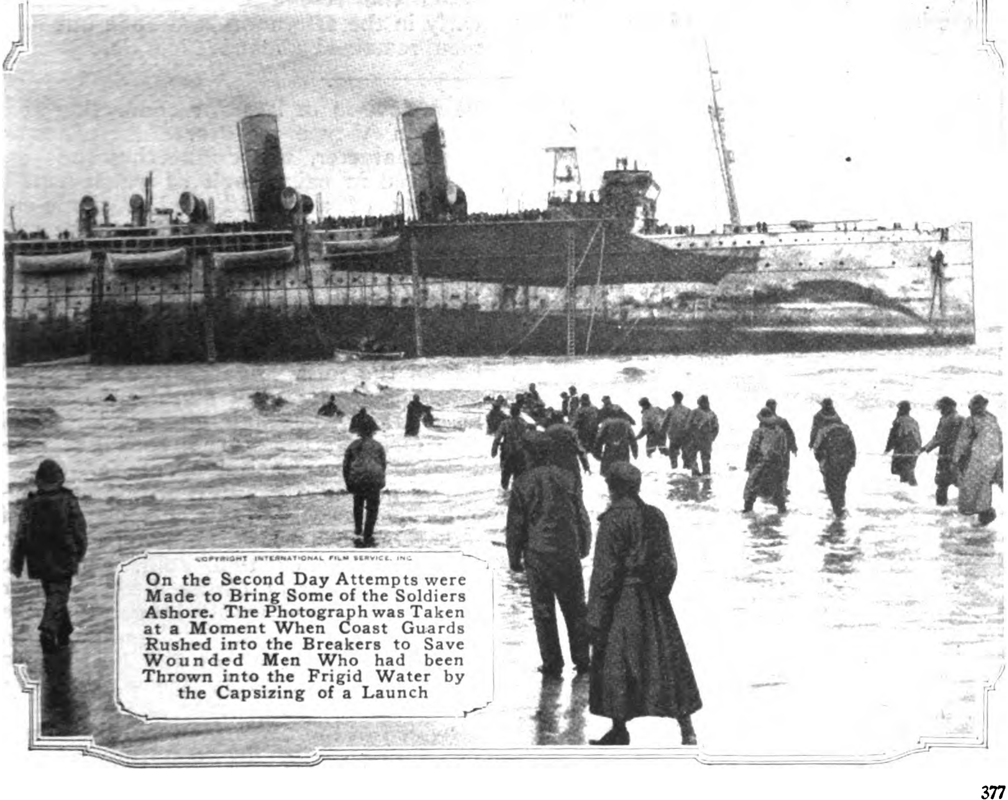
More Than Three-Fifths of the Soldiers Aboard the Transport Were Wounded Veterans of the Argonne. This Made the Rescue Work More Than Ordinarily Difficult. The Picture Shows How Crippled Men were Lowered into Small Boats Standing alongside the Great Liner



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On the Second Day Attempts were Made to Bring Some of the Soldiers Ashore. The Photograph was Taken at a Moment When Coast Guards Rushed into the Breakers to Save Wounded Men Who had been Thrown into the Frigid Water by the Capsizing of a Launch went aground at a point opposite Lenelyville. Mountainous waves pounded it mercilessly, lifting and tossing it inshore a few yards at a time, and hammering it against the smooth, hard sand so that it shook and groaned, while furniture was bounced around dangerously. In response to wireless calls and distress rockets, coast guards and naval craft rushed to the scene, but the raging sea made them helpless.

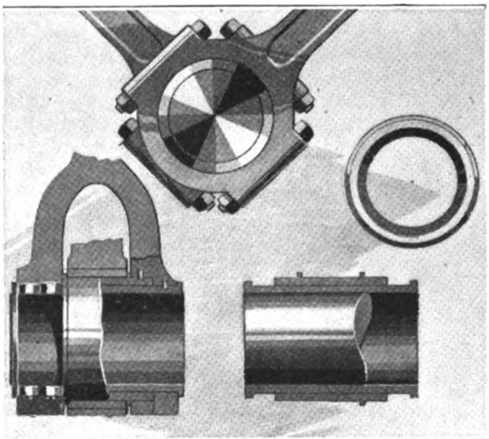
By noontime the ship had been driven more than 250 yards shoreward. The situation looked exceedingly serious. Two destroyers approached the troopship and fired lines across its bow. On the beach, where the coast guards had failed with the Lyle gun, men volunteered to attempt passing a line by boat to the ship. After a most heroic struggle in the breakers, they accomplished their seemingly impossible task. The rope was 300 yd. long, but the shore station had to be placed well out in the surf. It was then that the fates "lent a hand." The wind suddenly shifted and the stern of the "Northern Pacific" began slowly to swing around, bringing the ship parallel with the shore so that it rested on the bar instead of across it, and no longer was in danger of being broken in two. This stroke of good fortune made immediate use of the breeches buoy unnecessary, and no one was taken from the transport, which at the close of day was guarded by a fleet of a score or more craft, including cruisers, destroyers, and hospital ships, that stood by to render assistance in the event of emergency.

By the following morning the wind and sea had carried the ship 150 yd. farther shoreward—to within 150 yd. of dry ground. During the day 237 soldiers and 17 nurses were taken from the transport by breeches buoy, lifeboat, and trolley boat. After three boats, one of them a launch, had been capsized in the heavy breakers, and several wounded soldiers saved from drowning only by the heroic work of those ashore, operations were halted.

On Friday, the third day, the sea had subsided considerably, enabling 2,000 soldiers and nurses to be taken off the transport by light-draft submarine chasers and launches that worked between it and the vessels that stood by. Rope ladders were lowered over the starboard bow of the stranded ship and used by the able-bodied men in reaching rescue craft, which tossed alongside. The wounded were passed down in basket stretchers. The more seriously injured soldiers were left aboard until the next day, the fourth, when the rescue work was completed early in the afternoon and none but navy men remained aboard the ship.

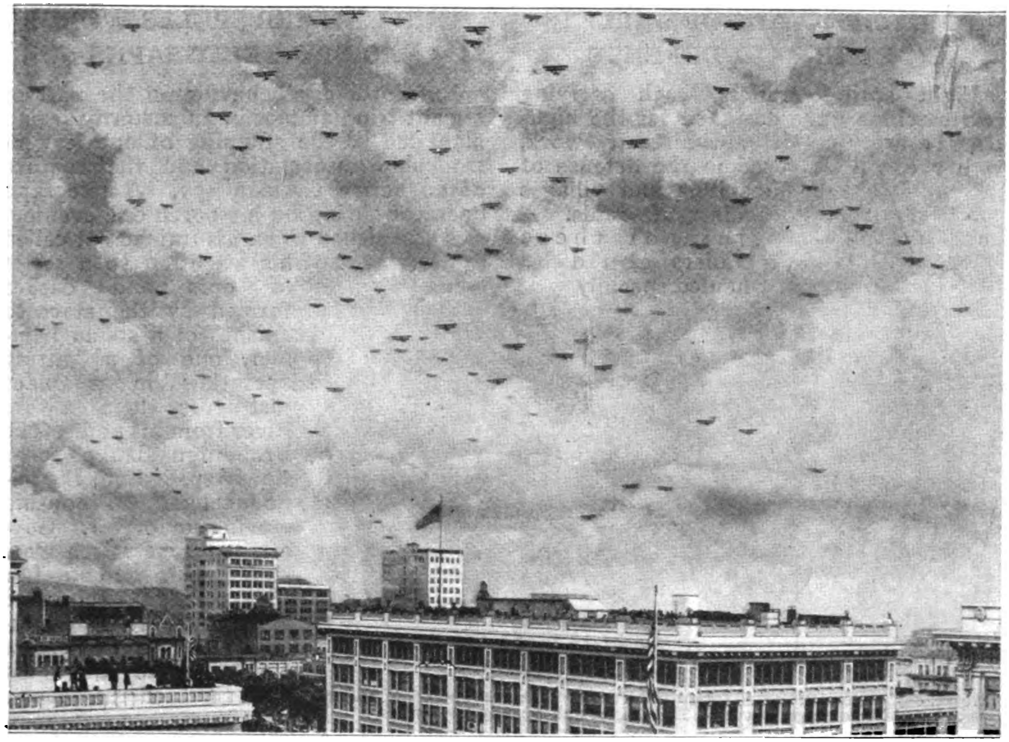
ADJUSTABLE CONNECTING-ROD BEARINGS FOR V-TYPE MOTOR

Simple bearings permitting independent adjustment, to compensate for wear, have been devised of late for connecting rods used in V-type motors. In engines of this character, the connecting rods are arranged in pairs, each of which usually consists of a forked and a single-end member used in combination. The customary bearing consists of a bronze-backed babbitt-lined sleeve clamped rigidly to the forked rod. It serves a dual function, for its outer surface forms the bearing for the single-end rod, which fits within the fork. The contention is held that this arrangement enables the adjustment of only the single-end rod, instead of both members, therefore involving replacement of sleeves to compensate for wear.



Top, Left, End View Showing Arrangement of Sleeves, and Part of Connecting Rods; Right, Cross Section of Bearings. Bottom, Left, Longitudinal View, Partly in Section, Showing Attachment of the Two Rods to the Sleeves; Right, the Two Sleeves Inclosing the Crank Pin

The new bearings aim to obviate difficulty by providing for the adjustment of either or both rods of an opposed pair. They consist of two split, concentric sleeves, separately clamped. The inner of these is considerably longer than the one that fits over it, and embraces the crankpin. It serves as the bearing for the forked rod, while the outer sleeve accommodates the other one, and is provided in the usual manner with a babbitt lining. Play between the inner, or



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Scores of Army Aeroplanes Skylarking above the Housetops of San Diego in Celebration of the Armistice: For More Than Two Hours 212 Machines Clouded the Air

forked-rod, bearing, and the crankpin, caused by wear, is taken up by the method usually employed in refitting the bearing of a single-end rod, that is, the edges of each half of the split sleeve are faced off. In readjusting the other rod, it is only necessary to face off the clamping cap of the outer sleeve.

LOW-TEMPERATURE PROCESS OF RUSTPROOFING STEEL

A low-temperature treatment of steel and iron in contact with zinc is being used commercially by a British concern to give tools and parts of machines a rustproof finish which is not injured by abrasion or denting due to usage. The parts to be treated are placed in a slowly revolving drum, where they are brought into contact with zinc powder. The temperature at which the drum is maintained causes the zinc to penetrate slightly into the iron, producing an outer coating of zinc, beneath which is a zinc and iron alloy. If continued usage bears out the claims of the concern employing this process, its adoption may become almost unlimited.

GREAT AERIAL PAGEANT STAGED ABOVE CALIFORNIA CITY

Never before has an American city been the scene of an aerial spectacle so extravagant as that which army fliers staged above San Diego, Calif., in celebration of the armistice last November. For more than two hours an armada of 212 aeroplanes maneuvered and flip-flopped in the sky while thousands of people in the streets and on the housetops craned their necks and watched the magnificent spectacle in open-mouthed wonder. Machines from three flying fields, Rockwell, Ream, and East, took part in the remarkable demonstration. Various types of craft, from fast-going scouts to the slower training planes and aerial ambulances, were represented. The new wireless telephone was used in directing the evolutions that constantly evoked exclamations from those who viewed them. It is reported that the machines covered a total of 34,000 miles in 424 flying hours, and returned to their respective fields without a single mishap. A striking feature of the show was a performance of aerial acrobatics by a picked team of five pilots.

PORTABLE WALL OF BULLETS FOR AIR-RAID DEFENSE

Two Machine Guns Mounted for Anti-Aircraft Work are Concealed under the Camouflage Cover of This Light and Speedy Trailer

Light spring trailers, each carrying two machine guns designed for the high-angle fire of anti-aircraft work, were used in the defense of hospitals and villages against air raids. A train of these trailers could be hauled speedily to the best point of vantage when warning was received of coming enemy air craft. Each trailer carried a considerable amount of ammunition for its guns, the whole being made inconspicuous by a camouflage cover. A train of 10 trailers, each with its two machine guns firing continuously, made a formidable opposition to any air craft flying low enough for effective bombing.

CAMOUFLAGE IN REVERSE FOR PEACE-TIME USE

Reversal of the camouflage principle, greatly increasing the visibility of its subjects instead of concealing them by blending them with the background, is declared a possible peace development by the naval officer who developed that particular nature-faking system. Since every positive has its negative, color applications opposite to those used for confusing the eye are being studied for a possible standardized system of making distant objects conspicuous.

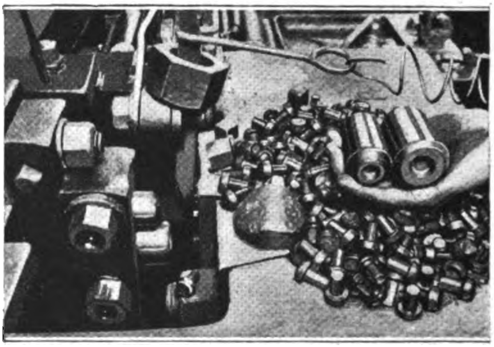
¶Men who have served in the Tank Corps are moving for permanent organization in several communities. The "Tank Cats" of Chicago already is formed.

TRIP HAMMER SPELLS WORDS AS SPY TELEGRAPHS

Extraordinary behavior on the part of a giant trip hammer in an eastern forging plant led to the stopping of one leak of troopship information and the capture of an active German spy. A telegraph operator sitting on his porch one evening, was astonished when his trained ear called his attention to a series of dots and dashes formed by the staccato crashes of a steam hammer, one of a battery operating in a plant just across the Delaware River from his home. The Brobdingnagian clicks slowly spelled out the announcement, "Troopship moving tomorrow." Government operatives were summoned, and a few nights later deciphered another treasonable message in ponderous Morse code. While the agent who received the reports was not discovered, it was easy to find which one of the hammer operators had telegraph experience.

DIES MAKE FIFTY THOUSAND ROSE-HEAD RIVETS

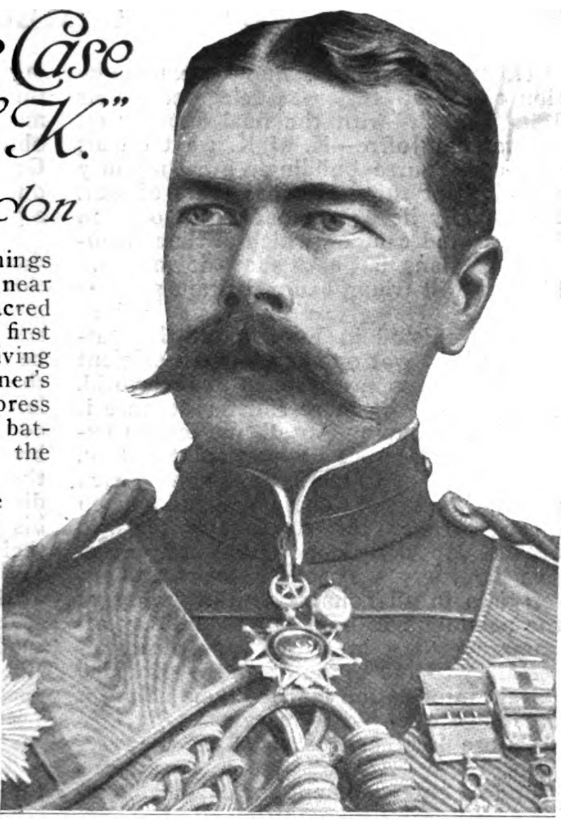
The dies shown herewith were photographed after they had made 50,000 so-called rose-head rivets from ¾-in. wrought iron. This excellent record was possible on account of proper hardening and heat treating of the carbon steel used. The dies were used on a heading machine and formed 1,800 rivets per hour.



Dies Photographed After They had Formed 50,000 Rose-Head Rivets from Wrought Iron: They were Used on a Heading Machine

The Mysterious Case of "K. of K."

By E. T. Bronsdon



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HERBERT KITCHENER

First Earl of Khartoum, Viscount of Vaal and Aspall.

In Those Lazy Days before the Disillusionizing War, Declarations of England's Unpreparedness Failed to Disturb the Tranquillity of the Public. To the Popular Mind All Talk of Insecurity Was Folderol—for There Was Kitchener

ALONG the Nile River strange things were happening. On the shores near the last of the cataracts, a region sacred to camel travel since the time of the first Pharaoh, two lines of steel were driving toward Omdurman. It was Kitchener's railway, being constructed for the express purpose of transporting British battalions into the dread country of the Mahdi.

As engineers have testified, the handicaps of heat, native treachery, and lack of water made the work next to impossible. The iron will of Kitchener alone kept it from faltering.

Every man under "K. of K." had caught the spirit of success at any cost. It therefore was with fear and trembling that a young subaltern, in charge of a dynamite transport, sent in the following message: "Regret to report disastrous explosion. Nine men killed." Visions of court-martial and disgrace doubtless were in his mind.

Kitchener's reply was terse. "Do you want more dynamite?" he asked.

This story of Kitchener was told through the length and breadth of Great Britain at the time of his campaign in the Sudan. It is related here simply to show how the world looked upon this great soldier at the outbreak of the war with Germany. England herself was getting prosperous, fat, and lazy. All the faults that come with wealth and security were hers in some degree. When one of her statesmen would goad her with taunts, telling her how poorly she was prepared to cope with a powerful foe, common folk, in London, Edinburgh, Dublin, would shake their heads over the columns in the Times or News; then they would smile reassuringly at one another and say, "Oh, yes, but we have Kitchener!" By reason of dozens of authentic stories such as the above, and because also of the perfect record to his credit in Palestine, Egypt (commander of the khedive's army), Suakim (as governor-general), the Sudan, India and Africa, Great Britain looked upon him as at least a demigod—a man of sterling capability and will of annealed steel, to whom nothing in military accomplishment could be impossible. Britons attributed to him every quality they themselves lacked. He would "stand no nonsense." He was blunt. He sought no public adulation; just so the matter in hand was finished satisfactorily, was all he asked. In fact, he preferred some outlandish post—Zanzibar, Khartum, the province of the Red Sea—so he would have to attend no balls, banquets, or other social functions. He was efficient to a degree never reached before in the history of Britain's military.

The real chronicle of his successes and failures has been told. Of the former he had many; of the latter, a few. Suffice it to say that at the time Lord Haldane persuaded Sir Edward Grey to accept his resignation in favor of Kitchener as war minister, Britain drew a long breath of relief. During the long months that followed he trained the great army he was building, carefully and methodically. Though, eight months later, Lloyd George had taken over the new post as minister of munitions, Lord Derby had been placed in charge of recruiting, and a greater portion of the strategy was delegated to Sir John French—with the final supervision of Marshal Joffre—K. of K. went on his own wise course, building a great military machine for three or more years of war. Continually he was at odds with opinion in press and cabinet, which at times menaced his plans, but each show-down found his iron will triumphant. Britain got her army.

There existed in England at the outbreak of the war one of the most efficient and dangerous spy systems in the world. This was all the more sinister because it was in the employ—in all but certain exceptional cases—of no particular nation. It consisted of a coterie of extremely rich international Jews. These men and women —for there were three or four women who became especially obnoxious—had extensive investments in bonds, stocks, and enterprises in all countries. The swing of the pendulum in politics and military affairs gave these creatures opportunity incessantly to add to their wealth—provided certain information reached them before it became known in the markets.

Before Kitchener arrived to keep secrets, these Jews kept up a continuous round of entertainment for cabinet members. Though no accusation of treachery ever has been brought against one of the latter, it is certain that the Jews got what they went after. With the aid of lavish hospitality, they simply managed to deduce knowledge that meant millions monthly to them. A cabinet minister might have the matter of the sale of certain properties mentioned in his presence. At another time he might be asked indirectly whether he thought—as an individual, of course—whether a week or a month would see a great rise in the value of the properties. This was equivalent to asking whether he knew of any government action that would bear directly on the matter. As a man he gave his idea concerning the possible rise, perhaps vaguely, perhaps with no explanation whatever. The Jews, however, knowing their guests as gentlemen, knew the whole situation immediately, and acted accordingly.

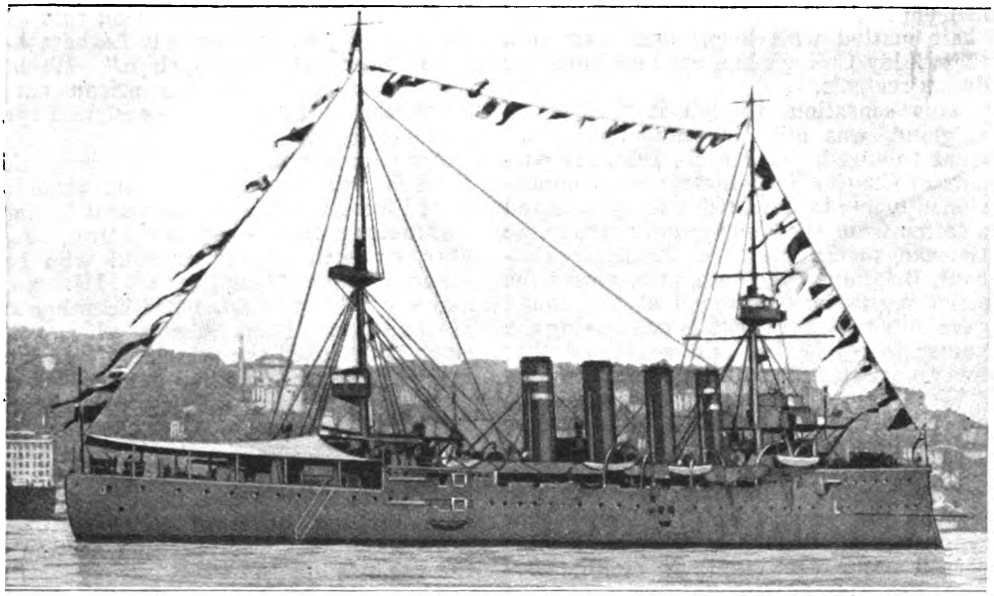
Though this sort of thing was not exactly just to Englishmen themselves, it would not have been so bad had not Germans kept close watch of the Jews. Knowing them to have the inside track with many men "in on the know," the Huns found themselves able to keep an accurate check on the progress of affairs in the chief enemy camp simply by watching the Jews making their transactions, and figuring the reasons behind. In addition to those Jews who had no other motives than mere money making, some few, feeling no obligation of country or race, helped the Germans directly. These were stamped out gradually, but the evil they did was a great handicap at first.

Kitchener took one dinner—at a London café—with a prominent member of this international coterie. During the meal he discussed nothing but the superstitions of the country (Ireland) in which he had spent his boyhood. At the end of the meal he refused to allow the bill to be left on the account of the Jew, who, of course, had unlimited credit at the place, but asked and paid for his own score. All the rest of the time he was in office he disregarded or refused all snares put in his path by these people, thereby earning their most cordial enmity. It was useless for them to pester him; he turned his gruffest mien. During the one year and seven months that followed, the Jews made far less money, for Kitchener kept not only his own secrets, but saw to it that the other cabinet members knew no more than the press told concerning vital matters.

This would not be of importance except for what followed. On a certain spring day in 1916—the Germans claim the date to have been June 5th, and the British Admiralty so far has been silent on the subject — the transport "Hampshire" left Queenstown for Archangel. Whatever the date, or whatever the accident that happened—the British naval report said that the "Hampshire" struck a floating mine, while the Germans stated definitely that the submarine "U-29," later accounted for by the allies, sank the vessel—the "Hampshire" never reached port. K. of K. had been on board.

The week following the receipt of this news was one of mourning, horror, and uncertainty in Great Britain. Over one hundred vessels scoured the sea in the path supposed to have been taken by the "Hampshire," but not even a single body or a piece of wreckage was recovered. The nation grieved; its greatest national hero certainly since "Chinese" Gordon, and probably since Nelson, had been snatched away without warning and without explanation.

Certainty concerning his death never was reached, at least as far as the man on the street was concerned. Only a few days after the sad news, came a whisper that the Jews had furnished news of his going, to the Germans, who had lain in wait for the "Hampshire" and captured it.



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It Was aboard the "Hampshire" That Lord Kitchener Left Queenstown. The Vessel, Here Shown, Was an Armored Cruiser of the "Devonshire" Class, and was Completed in 1905. It Was 450 Feet Long and of 10,850 Tons

Another of the rumors said that Kitchener had reached an impassé with the cabinet, and that rather than have his hands tied, he had retired to Khartum incognito—"or to one of those places, you know." Because this is precisely what Kitchener might well have done if the pacifists and the "no-expeditionary-force-to-France" agitators had carried public opinion with them, the idea gained much credence for a time. The English press, however, quietly communicated with its correspondents in all parts of the empire, discovering by the process of elimination that, if Kitchener had gone into private life, he had deserted all of the haunts that had known him earlier—something practically impossible for a man of strong likes and dislikes, such as he.

Then came a startling development. A woman by the name of Biddy Cullogh came forward with the statement that she had seen and spoken with Lord Kitchener. He had confided in her that his work in the present war was done, but that if England's necessity ever demanded, he would come back to help.

Immediately the British Isles were in a furore. One diligent reporter discovered that Biddy Cullogh was an old hag who lived in Ballylongford, near the head of the Bay of Taplee, Kerry, Ireland, and that she was known about the country there as a witch. Her chief claim to fame previous to her "interview" with the supposed dead man had been the fact that, 37 years previously, she had told the fortunes of Lieut. Col. H. H. Kitchener—Lord Kitchener's father—and of his three sons. The prophecy, uncovered in the father's scrapbook, was sheer drivel so far as all but Herbert was concerned. He would "conquer many lands, but at last come to the sea after years of wandering," she had said of him. This career was not so difficult to guess, in spite of all the importance attached to Biddy Cullogh's foresight, since at that time Lord Kitchener had been a student at Woolwich. The touch concerning the sea might have been entirely fanciful, and borne out by mere coincidence.

The British saw to it that she was pinned down to her statements, however, and the upshot of it all was that she admitted, under some pressure, that she had seen Lord Kitchener in a dream, and not in the flesh. The only permanent effect she had created was one of doubt in the minds of most people, who put her down, with probable exactness, as something of a faker. A few there were, however, who professed to see the dark hand of "influence" behind her change of stand. They claimed that the authorities, who were only too well satisfied with Kitchener's sudden retirement, had brought pressure to bear on the old woman, and persuaded her to give herself the lie. The story, in the final version that appeared in the English papers, rather ridiculed the props of "hair matted with kelp," and what not, that Biddy Cullogh had used to make her dream realistic.

This sensation, though it thrilled all England, was mild in comparison with what followed. In March, 1917, the parents of Charles T. Latham, a noncommissioned officer in the British army, received a letter from their son, penned from the German prison camp at Jadoigne, Brabant, Belgium. The note, in line with the strict regulations enforced at the camp, gave only optimistic details concerning the young man's health, and requested that several articles of clothing be sent to him.

The parents had known of his passage on the ill-fated "Hampshire," and so had given him up for lost months before. In their joy they told the news far and wide, and it spread like wildfire. "My boy also was on the 'Hampshire'!" "They've got Kitchener a prisoner in Germany!" was passed along from mouth to mouth. Before even the papers could investigate the story and print it, a fair proportion of the people in England were positive that somehow or other the Germans had managed to sneak into the fourth dimension, and had taken the "Hampshire" past the British navy and into Wilhelmshafen.

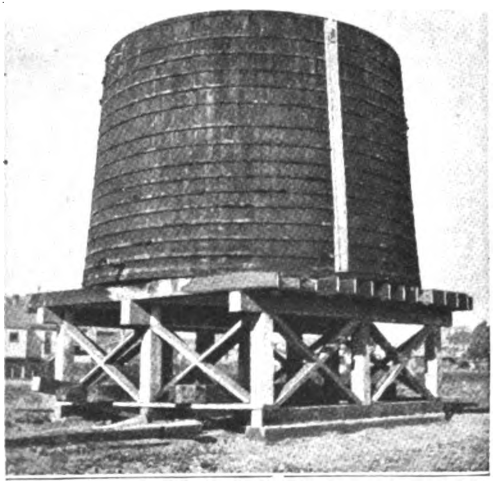
This was the last great rumor. Unlike the rest, it had some foundation that was capable of proof. Sergeant Latham had been aboard the "Hampshire." He had been taken to a German prison camp. There the truth came to an end, and speculation began.

According to the terms of the armistice, English prisoners at Jadoigne were released some weeks ago. Sergeant Latham was among them—but not Lord Kitchener, or even one other soul who had sailed on the "Hampshire." His story added but little to what had been known. He had been asleep. Two terrific explosions had racked the vessel, and she sank in a few minutes. He had been picked up, after a half hour of holding to a life preserver, by a German U-boat. They had taken him, he thought, mainly as a proof of the "Hampshire's" sinking, which they claimed to have accomplished. He had seen nothing of Lord Kitchener, and heard nothing all of the time he was in the enemy's hands.

There ends the story of Herbert Kitchener, first Earl of Khartoum, Viscount of Vaal and Aspall. Because it cannot conclude with authenticated records of the last action and last words of this greatest of professional soldiers, to many of his admirers and foes it may always remain shrouded in mystery.

BIG TANK FOR IRRIGATING FIELDS IS PORTABLE

A novel accessory to an irrigation system in Alameda, Calif., is a 40,000-gal. water tank which is moved a considerable distance back and forth on rollers between two tracts, as the need arises. The tank serves as a reservoir from which pipes laid in the fields are supplied with water under pressure, in order that it may be discharged through sprays instead of in the ordinary fashion.

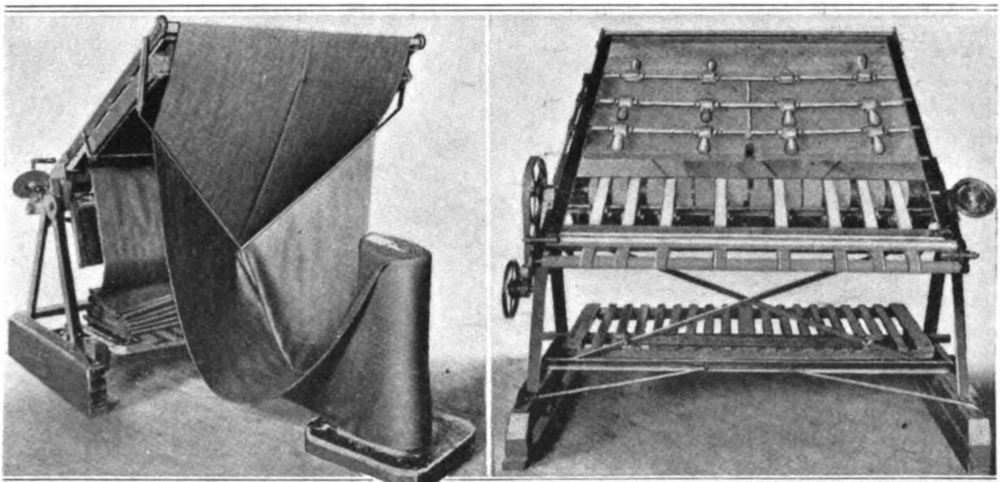


This 40,000-Gallon Water Tank is Moved between Two Tracts to Serve as a Pressure Reservoir, the Water from Which is Discharged through Sprays

COUNTY-OWNED MACHINERY AIDS LOCAL FARMERS

A limestone crusher purchased by the county agent of Allen County, Ky., does work for the local farmers at cost during eight months of the year, being used on county road work the other four months. A demonstration of the remarkable fertilizing value of limestone dust on red-clover fields so impressed the fiscal court of the county that the unusual purchase order followed.

¶Positive electrodes for flaming-arc lamps with their chemical mixtures applied on the outside, and arc-lamp carbons with metal sheaths are late European developments.



Left: Rear View of Machine, Which Enables One Cloth Examiner to Do the Work of Four, Showing How the Cloth is Unrolled, Spread Out Its Full Width, and Later Laid in Folds. Right: Front View of the Machine. The Lights Shown Are beneath the Plate-Glass Top of the Inclined Board

NEW MACHINE LESSENS WORK OF CLOTH EXAMINERS

A machine doing the work of four men has been built, which unrolls suiting for inspection, measures it, and refolds it—a task heretofore done wholly or in part by hand. The bolt is unrolled standing on end on a pivot, and the cloth is spread out full width, after which it is drawn over a tilted inspection board having a plate-glass top. It is then piled in folds of the proper width, ready for sponging and shrinking. Beneath the glass top are several electric lights which make it easy to detect flaws in the cloth as it moves along. Levers at either side enable the inspector to stop and start the machine at will, while a yardstick at the base of the board shows the width of the goods at all times.

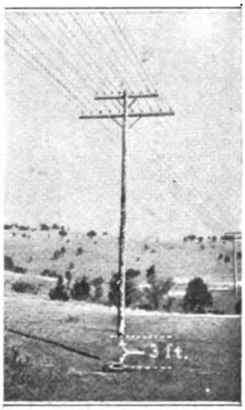
OIL-WELL FLOW INCREASED BY ELECTRIC HEAT

An electrical method of carrying warmth to the bottom of oil wells has been found in many cases greatly to increase the flow of oil. The heating process decreases the viscidity of the oil, usually occasioned by the admission of air to the well and the cooling of the rock bed. Minute crevices and capillary channels which afford easy passage to warm, thin oil become quite impassable if the oil gums. The electric heating method not only thins the oil but often generates gas whose pressure helps the oil to the surface. The system found military use in the abandoned oil fields of Roumania and Galicia.

FILMS OF FISH CATCHING TO INTEREST PUBLIC

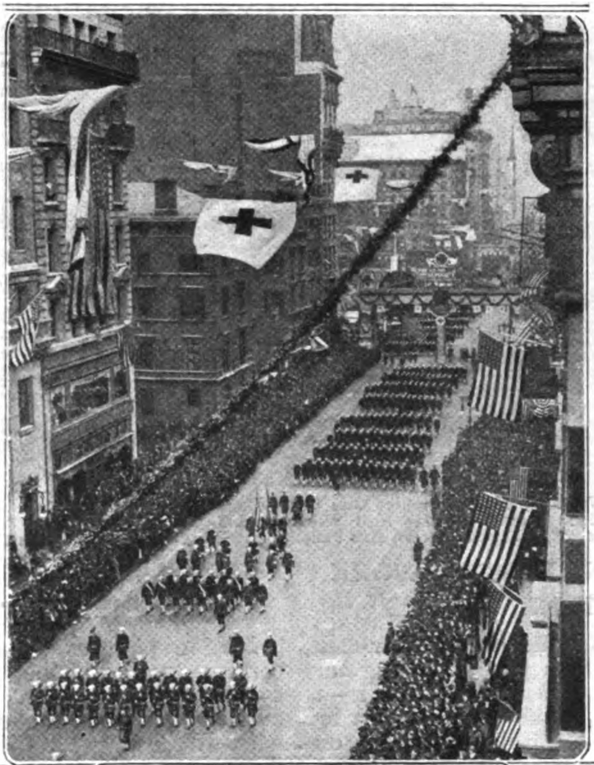
Motion pictures which take their observers to the fishing grounds of the swordfish and mackerel catchers are calculated to increase the interest and knowledge of the public on the subject of fish. Two reels of film, showing seining and harpooning operations, are arranged for school and club use.

TELEPHONE POLE SUSPENDED FROM CONTRACTED WIRES



On a telephone line in the Southwest is to be found a striking example of contraction of copper wires due to cold. One of the poles, situated in the bottom of a gully, has rotted through at its base and in cold weather hangs in mid-air with its lower end 3 ft. above the ground. The poles either side are on somewhat higher ground. Evidently the wires were strung in hot weather and pulled rather tight, the contraction of the copper strands accounting for the unusual sight.

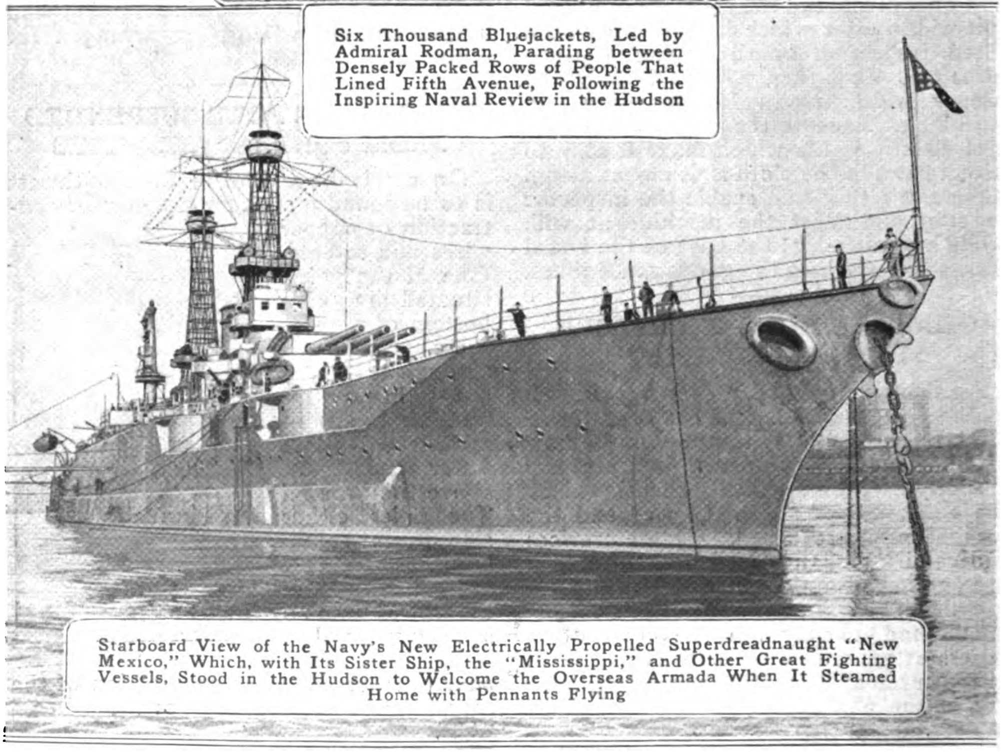
RETURNING OVERSEAS FLEET GIVEN OVATION



Six Thousand Bluejackets, Led by Admiral Rodman, Parading between Densely Packed Rows of People That Lined Fifth Avenue, Following the Inspiring Naval Review in the Hudson

ENTHUSIASTIC welcome was accorded America's overseas armada on the occasion of its home-coming during the Yuletide. The whole-hearted feeling of the nation was expressed in a signal ovation given the returning sea fighters by hundreds of thousands of New Yorkers who crowded both banks of the Hudson to witness the review, and later packed Fifth Avenue as it never had been packed before, to cheer some six thousand marching bluejackets, led by Admiral Rodman.

Snow and haze marred somewhat a naval spectacle of uncommon inspiration, when 10 gray-sided dreadnaughts steamed past the Statue of Liberty, the "Mayflower," with Secretary Daniels and his party aboard, and the "Aztec," which bore Assistant Secretary Roosevelt, to their anchorages. Nine of the great float-



Starboard View of the Navy's New Electrically Propelled Superdreadnaught "New Mexico," Which, with Its Sister Ship, the "Mississippi," and Other Great Fighting Vessels, Stood in the Hudson to Welcome the Overseas Armada When It Steamed Home with Pennants Flying

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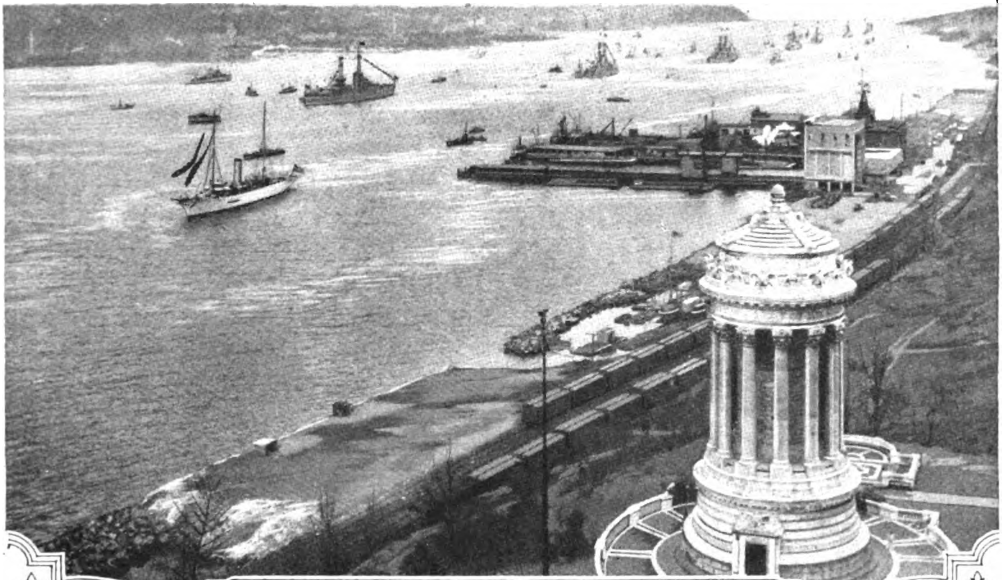

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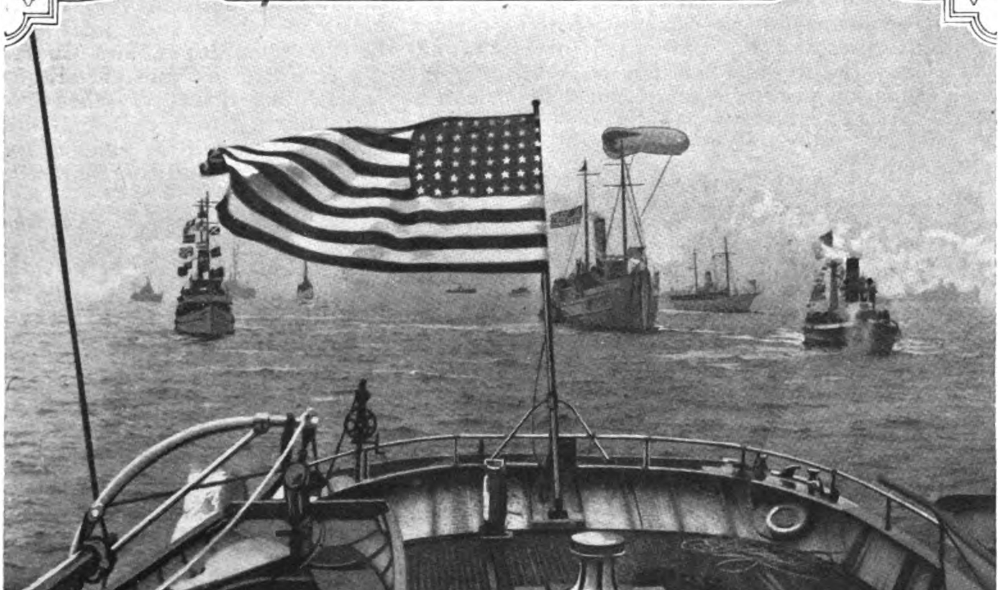
Led by the "Arizona," the Ten Gray Dreadnaughts Steamed into the Hudson on Time to the Minute and Aflutter with Flags of Every Color. In the Procession Were the Flagships "Pennsylvania" with Admiral Mayo, "New York" with Admiral Rodman, and "Utah" with Admiral Rodgers



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Secretary Daniels and His Party, Including the Widow of the Late Admiral George Dewey, Reviewed the Home-Coming Fleet from the Presidential Yacht "Mayflower," above Which Hovered an Observation Balloon. The Air was Filled with the Roar of Guns, for Each Ship Saluted as It Passed ing forts, flying from their aftermasts long, homeward-bound pennants that trailed far astern, were fresh from active service in British waters where part of their number coöperated with the Grand Fleet, and others operated from a base in Bantry Bay. The tenth vessel was the "Pennsylvania," flagship of Admiral Mayo, commander of the Atlantic fleet, returning from Europe after escorting President Wilson to France.

As the ships, aflutter with flags and headed by the "Arizona," filed past the "Mayflower," they saluted the Secretary of the Navy. When they reached their anchorages, the Hudson harbored one of the greatest assemblages of American fighting ships ever congregated, for there also rode at anchor the fleet of Vice Admiral Grant that had stood guard in home waters. Among the latter were the "New Mexico" and its sister ship, the "Mississippi," the navy's new electrically propelled superdreadnaughts which recognize no peers, either in home or foreign waters.

At the conclusion of the review of the fleet under way, the "Mayflower" circled the ships, and Secretary Daniels reviewed them at anchor. Instead of salutes being fired a second time, the national anthem was played as the presidential yacht passed each of the vessels.

BIG STEAM TRACTOR OPERATES PUMPS AT CITY WATERWORKS

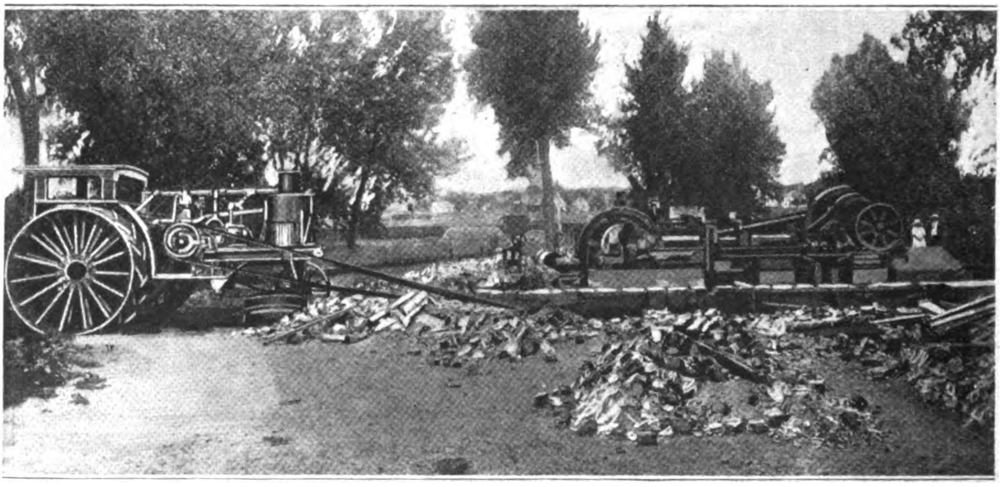
After the power plant of the Pierre, S. D., waterworks was destroyed by fire early in June, last year, a large steam tractor was assigned the task of operating the pumps. The latter force water through a 10-in. main, against a 290-ft. head, to a reservoir nearly two miles distant. The tractor had seen three reasonably busy years of service before being put to the test of supplying citizens of Pierre with water by working 24 hours a day, seven days of the week. In a short time it demonstrated its capacity to the city authorities and was purchased for a sum amounting to only $300 less than its original market price. Recent advices indicate that the tractor is still in continuous service and giving a satisfactory account of itself.

BOTTLED HEALTH PASSPORT GUARDS AMERICAN SEAMEN

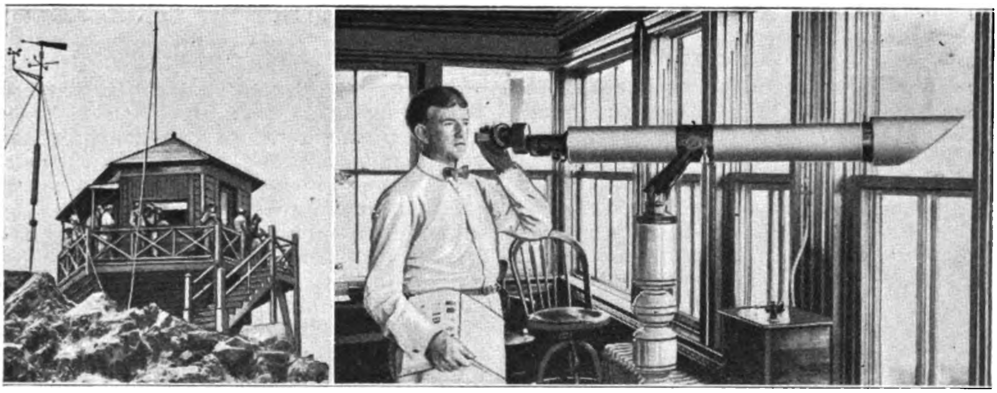
Little glass bottles now carried in the pockets of American sailors contain printed forms which, properly filled out by a ship captain, serve as "passports to health." They admit their bearers, if ill, to United States marine hospitals and insure the best free medical care everywhere.

OBSERVERS REPORT APPROACH OF ALL MERCHANT VESSELS

The entrance of all merchant vessels into certain bodies of water, such as Puget Sound, the Columbia River, and Chesapeake Bay, is noted by an official observer of the United States Weather Bureau. Communicating with each craft by signals, he learns its name, the name of its captain, its destination, and the character



This Big Tractor, Working Steadily 24 Hours a Day, Pumps Water through a 10-Inch Main to a Reservoir Nearly Two Miles Distant, at an Elevation of 290 Feet



Left: The Vessel-Reporting Station at the Top of Mount Tamalpais, to the North of the Golden Gate, California. Right: The Observer at Cape Henry, Virginia, Who Reports All Vessels Bound for Norfolk, Newport News, Baltimore, and Other Points on Chesapeake Bay

of its cargo. This information is at once telephoned or telegraphed to the proper authorities so that dock berths can be made ready and facilities provided for unloading. Often it is possible to have freight cars spotted in advance to receive a perishable cargo.

ITALY COINS NEW THALER IN ANTIQUE PRESS

For esthetic reasons the Italian government is using the old weighted-lever press for coining the new thaler, designed to supplant the Austrian thaler for circulation in East Africa and along the Red Sea. The old press exerts its pressure only on the two faces of the silver disk, entirely neglecting the edge. As a result the finished coin has a free margin and its contour is not exactly round. Handling the old press requires a higher degree of technical skill than operating a modern coin press. The revival of this ancient method, long in disuse, was demanded by the free design of the new coin, its purpose being to displace its foreign-born predecessor without encountering popular resistance to change.

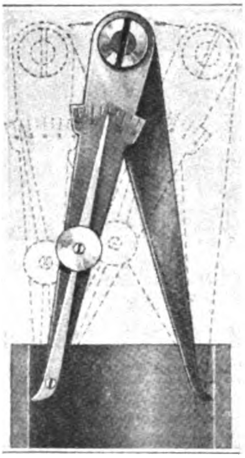
ℂUnited States mints worked 24 hours a day during 1918 to meet the demand for silver half dollars, quarters, and dimes, of which coinage $35,000,000 was produced.

EUROPEAN COMMUNAL FORESTS HELP PAY CITY TAXES

A source of revenue which many European cities enjoy, but one which is unknown to American municipalities, is the communal forests, some of which pay a generous part of the towns' annual tax bills. Probably the European record has been set by a Swiss town of 16,000 people which makes $66,000 a year from a relatively small piece of timberland. Some of the French municipalities are close rivals. The forests being near the market, the communities are able to sell not only the logs for lumber, but the small branches for firewood, and the leaves and twigs for animal bedding. During the war, Canadian and American forestry battalions were stationed in many of these forests, preparing lumber for army uses.

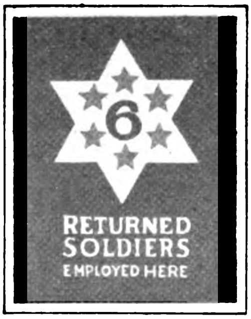
Logs Taken from a Communal Forest in the Jura Mountains, in France, Which Is an Important Source of Revenue for the Municipality Controlling It

INDICATING GAUGE OF NEW DESIGN



A new indicating gauge, somewhat resembling an ordinary caliper but having special features requiring that it be used a little differently, has been placed on the market. The tip of one of the legs of the instrument consists of a pivoted lever connected with an indicator attached to the side of the leg. The latter shows small fractions of an inch much magnified. After adjusting the gauge by means of a micrometer, it is placed inside or outside the object in work, and any variation from the size desired will be shown by the changed position of the indicator hand.

FLAG FOR EX-SOLDIER EMPLOYES



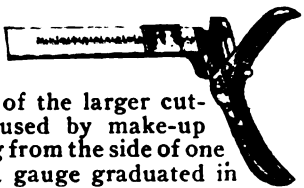
A new sort of a service flag—one telling how many returned soldiers are employed in the establishment displaying it—has been hung up in a Seattle office. The banner has a blue field with a white border, and in its center is a large six-pointed white star. On the latter are small blue stars surrounding a large blue numeral, indicating their number. This numeral, together with the legend "Returned Soldiers Employed Here," explains the meaning of the flag.

¶ Warnings of forest-fire danger resulting from weather conditions have been extended by the United States Weather Bureau to include protection to crops and stocks in districts of special fire hazard.

FILMS FOR NEW CITIZENS SHOW OPPORTUNITIES

When the United States Bureau of Naturalization has exhibited to its alien guests a movie record of America's national and industrial history, it will proceed under its new plan to present to them a still more interesting series of films. The pictured story of a naturalized citizen's success with a fruit farm, in all its stages from the acquisition of the land to the completion of a home for the family, will be followed by studies of certain trades, revealing to the new American his possibilities of usefulness in productive labor. The shoemaking trade, to mention one example, will be detailed on the screen from "close-ups" of the machinery to the finished product. These films, accompanied by the running comment of a teacher, will soon acquaint the stranger within our gates with the fundamentals of American industry.

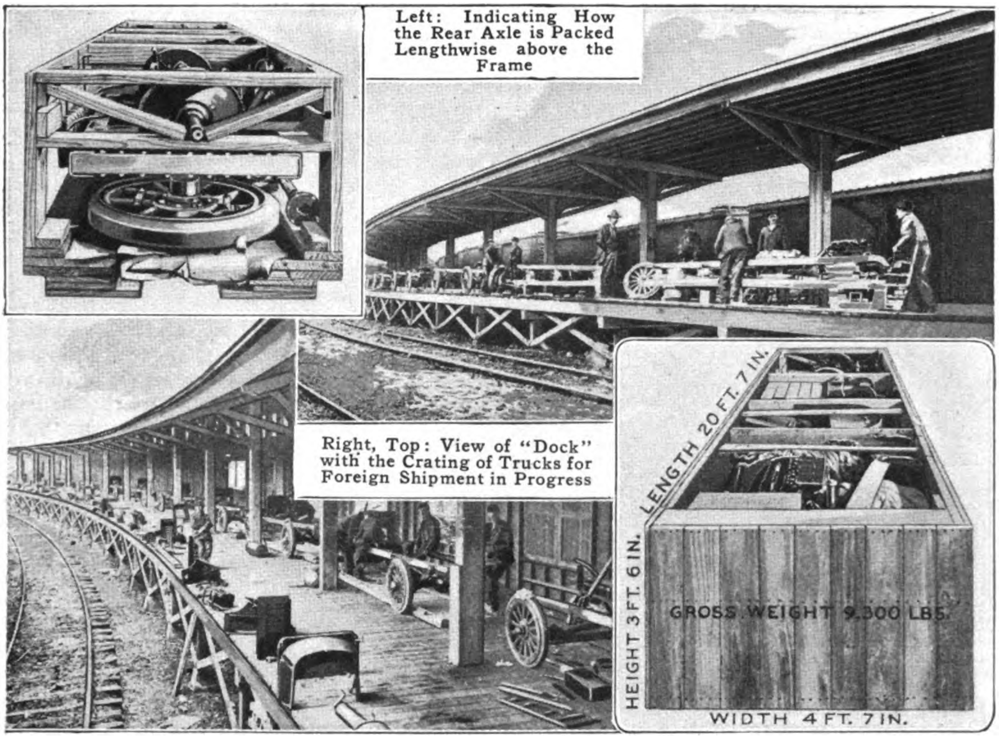
NEW LEAD AND SLUG CUTTER A SMALL HAND TOOL



A convenient timesaving tool for use in composing rooms is a lead and slug cutter not much larger than a pair of pliers, which takes the place of the larger cutter commonly used by make-up men. Projecting from the side of one of the jaws is a gauge graduated in ems, on which is a sliding guide. A compound lever system actuates the blades so that the tool is easy to operate.

AIR-FILTERING MACHINE MADE WHOLLY OF IRON

An air filter containing nothing but iron is one development of Germany's shortage of wool, which material was formerly used to filter the air for cooling electric machinery and for operating compressors. The new filter cleans the air by conducting it through devious channels whose surface is large in proportion to their section. Particles of foreign matter are thus removed both by friction and by the baffleplate action of the sudden turns. The process is entirely a dry one, and therefore not of the type which substitutes washing for filtering. The device is reported to offer little resistance or back pressure.



Left: Indicating How the Rear Axle is Packed Lengthwise above the Frame

Right, Top: View of "Dock" with the Crating of Trucks for Foreign Shipment in Progress

Trucks are being Disassembled on the Platform Above, Preparatory for Packing. The Box Illustrated at the Right Contains All the Parts of a Three-Ton Truck and Is Ready to be Covered

SAVE TIME, LABOR, AND SPACE IN CRATING TRUCKS

One of the well-known motor-truck companies has materially reduced labor and conserved shipping space by inaugurating a new method of crating machines for consignments overseas. In the past the disassembling and boxing of a truck has kept a dozen men busy 12 hours. The work is now accomplished by four men in four hours. Furthermore, the size of the packing case has been reduced about 16 cu. ft., obviously an item of importance in view of the prevailing shortage of bottoms.

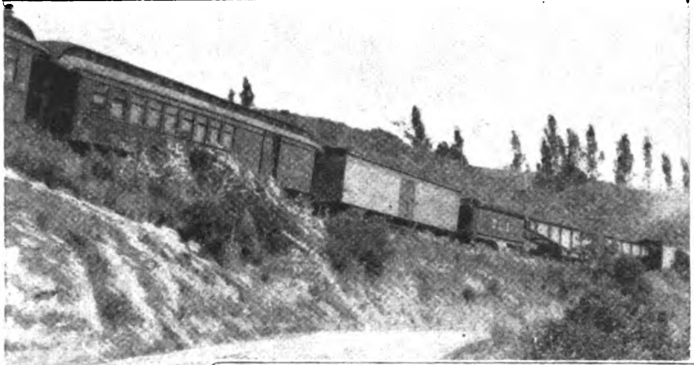
The savings in time, labor, and shipping space have been effected by abandoning progressive disassemblage and also by demounting the front and rear axles, instead of leaving them in place. The merits of progressive assembling are patent. Progressive disassemblage, however, is quite another thing, for it scatters parts and makes necessary their subsequent collection and transfer to the last station, where the crating is done. On the other hand, by removing the axles and placing them longitudinally, it is possible to reduce the width of the packing crate approximately a fourth. This arrangement in turn makes it possible to pack all the wheels beneath the frame, instead of above it, and thereby reduce the height of the crate. These simple changes have enabled the various parts to be made fast, adjacent to their respective normal positions, in a box that is only two inches higher than the top of the motor, which of course, with the transmission set, remains bolted to the frame.

In accordance with the present system, a car billed for foreign shipment is run astride the bottom of its crate on the packing dock after the road tests have been completed. Four men, trained especially for the work, disassemble it in reverse order to its original progressive assembling. This means, for instance, that the radiator core is removed first, instead of last, and other members are demounted accordingly. Throughout the procedure, the truck remains in position over the floor of its packing crate, which, incidentally, may later be used as the body platform. Also there are enough 20-ft. hardwood boards used in the crating to serve as material for the sides of a finished body.

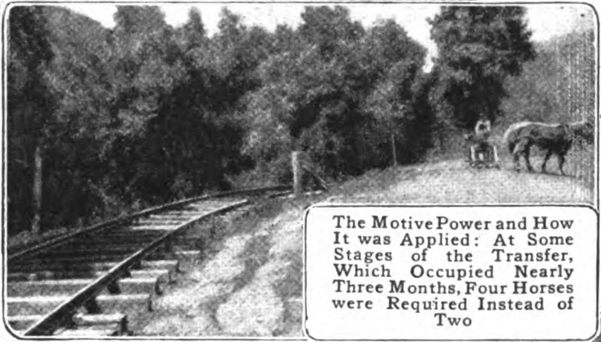
RESCUING A MAROONED TRAIN WITH CAPSTAN AND CABLE

By J. E. MURPHY

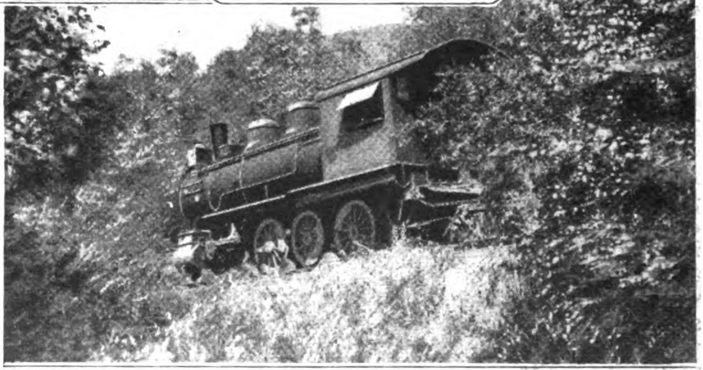
USING a house-mover's outfit for hauling a train weighing more than 400 tons, over grades and curves that it would have been impossible for a locomotive to operate on, was the unusual feat in railroading recently performed on a branch line of the Santa Fe in California. The scene of this undertaking was Temecula Cañon, where the railway running from Oceanside, on the Pacific, to the inland town of Fallbrook formerly terminated. In midwinter, the line in the cañon was washed out—washed so clean that in most places it was impossible to find a trace of the track or roadbed. A complete train, consisting of an 80-ton engine, two passenger coaches, four refrigerator cars, and four freight cars, one of which was a flat car loaded with a 36-ton turntable, was left stranded in the cañon. Obviously, with rolling stock at a premium, the railroad company could ill afford to abandon this isolated train. Since the cañon was subject to destructive floods and had given a great deal of trouble in the past, the railway officials decided to abandon this route and build through another cañon to Fallbrook. The real problem of this scheme was the rescue of the marooned train, which was valued at about $50,000. The only way to get the train to the new terminus was by a crooked route leading over the ridge that separates the two cañons, and this was a thing that could not be done by any ordinary railroading methods. The total distance was 8,300 ft., or slightly more than a mile and a half, and it was necessary to lift the train, in a distance of only 4,300 ft., to a height of 440 ft. above the bottom of the cañon. As a possible solution of the difficulty, a house moving contractor, long experienced in the heaviest class of work, was called in and told to bring the train "home"—if he could. A temporary track was built, and in this track excessive grades and curvature were both unavoidable. The steepest grade was 14 per cent, or 739 ft. to the mile, while the average was more than half this. At one point, the track was built on a curve having a



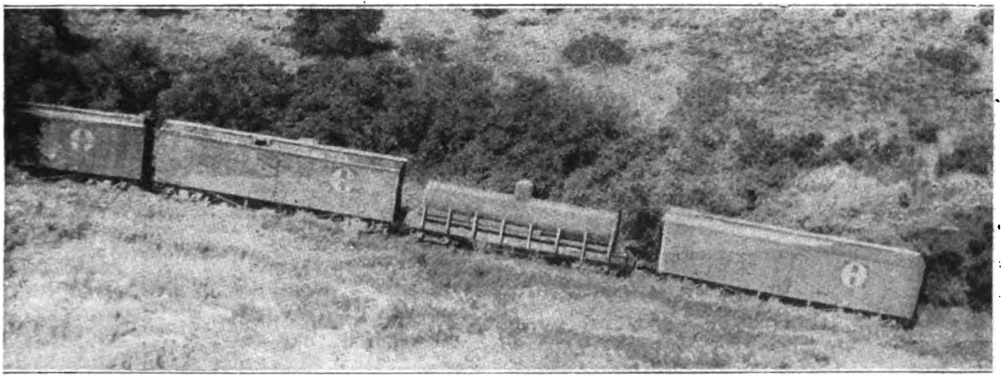
On a Sharp Curve near the Summit of the Ridge That Separates the Two Cañons



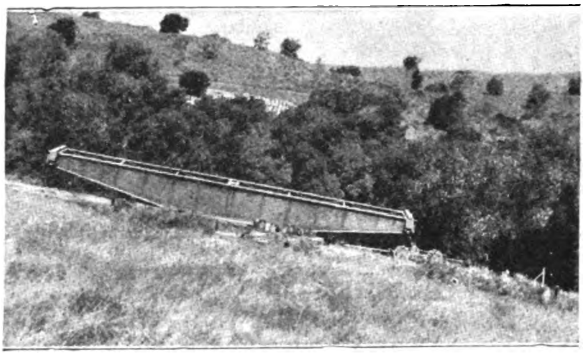
The Motive Power and How It was Applied: At Some Stages of the Transfer, Which Occupied Nearly Three Months, Four Horses were Required Instead of Two



Pulling the Engine Backward: The Removal of the Small Wheels Shortened the Wheel Base So That Curves could be Negotiated

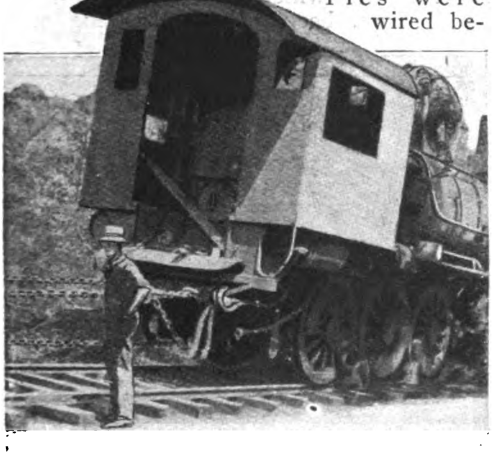


The Steepest Section of the Grade, the Incline at This Point Being at the Rate of 789 Feet to the Mile: Here Four Horses were Required to Work the Capstan



The Framework of the Railroad Turntable Which Occupied a Flat Car in the Train: It is Here being Drawn Up a Steep Grade

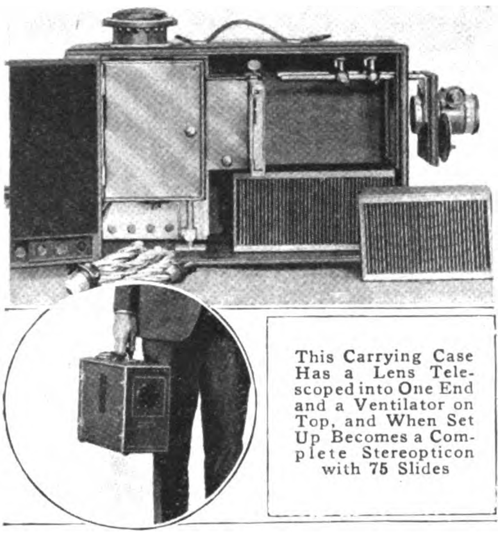
radius of only 144 ft. Extreme care was necessary to avoid the danger of losing the train down the side of the cañon. The house-mover's capstan used on the job had a 10-in. spool and an arm with a 9-ft. sweep. The general plan adopted for handling the work was to pull the entire train forward a short distance in "cuts" of one or two cars, repeating this process until the work was finished. By using a ½-in. steel cable and six single-sheave blocks, the 80-ton engine was easily pulled up the 14-percent grade by four horses. On the lighter grades two cars were taken at one pull, usually by two horses, while on grades that were less than 10 per cent two horses were easily able to handle 50-ton loads. Ties were wired behind each pair of car wheels, and 12 by 12-in. chocks behind each pair of engine drivers, these being dragged loosely on the rails so that they would block any backward movement. The cars and engine were chained to the track when not in motion, and the added precaution was taken of removing the track behind the engine, which had been switched to the lower end of the train before the work started. The engine furnished the only real difficulty in connection with the excessive curvature, and to reduce this difficulty as much as possible the tender was removed and the engine was stripped down to a 15-ft. wheel base. Even with this precaution it was necessary to keep the inside rail on the sharpest curves well greased with crude oil and to elevate the outer rail 4 in. above the inner rail.



Pulling the Engine Uphill Backward: Note the Chocks behind the Drivers to Prevent a Runaway in Case the Chains or Cables should Break

This piece of salvaging work, which is probably unique in the history of railroading, was completed without mishap of any kind in a little less than three months. The cost of the operation was but a fraction of the value of the rolling stock which was rescued.

LANTERN, LENS, AND SLIDES PACK IN SMALL CASE


This Carrying Case Has a Lens Telescoped into One End and a Ventilator on Top, and When Set Up Becomes a Complete Stereopticon with 75 Slides

A case, which forms in itself the frame for a stereopticon with its lamp house and lenses, furthermore finds room for 75 standard slides in a space 17 by 11 by 6 in. The ventilator top and objective lens telescope into the case, which then somewhat resembles a large box camera, the outfit weighing but 12 lb. The lantern, connected by its cord and plug to any electric-light socket, may be used for projecting pictures on a screen, 10 ft. square or smaller.

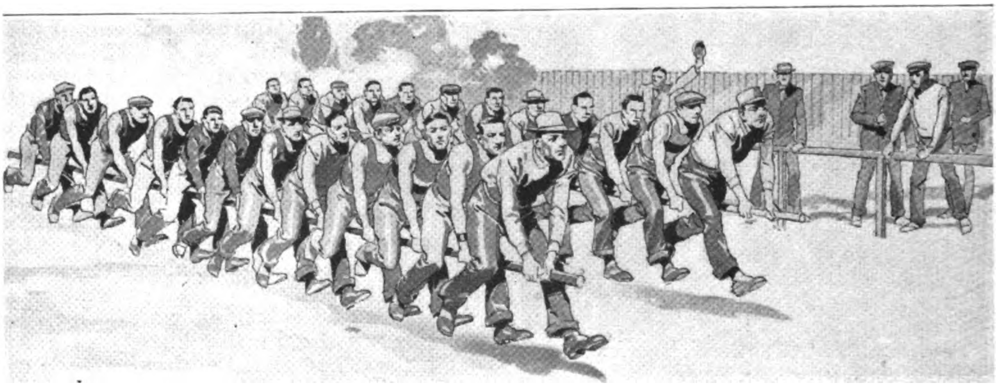
ℭArc-lamp carbons are mechanically covered with a thin coat of metal, which is then thickened by electroplating in a new European process.

TRAVEL TO NATIONAL PARKS MAY BREAK ALL RECORDS

In spite of war restrictions on travel, the number of visitors to the national parks in 1918 was 454,891, or about 90 per cent of the number of the previous year, according to a recent government report. In view of the fact that fighting has ceased and many new park privileges will be offered the public, more visitors than ever before are expected this year. The total appropriation for these national playgrounds for the year beginning June 30, 1918, was $1,012,000, while the revenue for the previous year was approximately $217,000. With the return of peace, it is hoped by patrons of outdoor recreation centers that congress will take favorable action on the proposal to make the Grand Cañon, Mammoth Cave, the Indiana sand dunes, and the big-tree areas, national parks.

"CENTIPEDE RACE" RIVALS OLD TUG OF WAR

Athletically inclined men and boys who formerly chose sides and proceeded to gratify their competitive spirit by a vigorous tug of war have discovered a new and rival form of group sport. The "centipede race" is a frequent event on the athletic field of a large rubber-manufacturing plant, whose executives encourage manly sports of all kinds. The "centipede" is formed by 12 or 15 men who straddle a long pole and run down the field. Rival "centipedes" so made up are able to put forth efforts which, under the spur of competition, become quite exciting and well worth watching.


A "Centipede Race": A Long Pole and 12 to 15 Men Constitute a "Centipede," and Two of Them in Competition Make Quite a Spectacle

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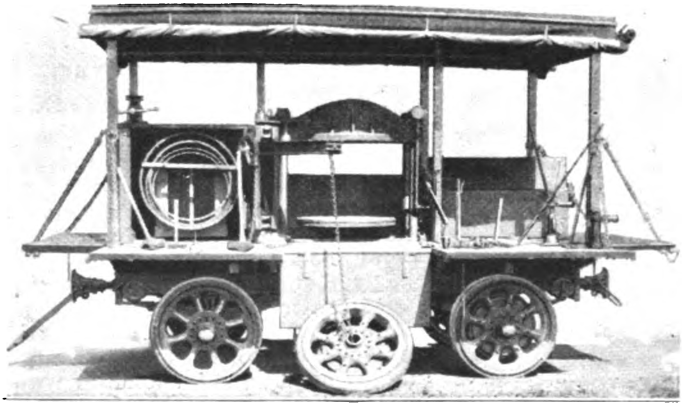
AN UNUSUAL VIEW OF AMERICA'S WELCOMING HAND

VIEWED from a different angle, this is the most welcome sight in the world to the millions of men who are beginning to trickle back home, in groups of hundreds or thousands, from the Old World to the New. The picture, because of its airy viewpoint, reveals some things not ordinarily observed in such perspective by the returning wanderer. Particularly clear is the 12-pointed star form of the base of France's generous gift to America, which holds its electric torch of liberty 300 ft. above the level of Bedloe's Island. The peculiar contour of the island itself is a feature not grasped at the normal altitude of vision, presenting an entirely new conception of our most familiar landmark.

ARMY AUTO TRAILER EQUIPPED AS TIRE-REPAIR SHOP

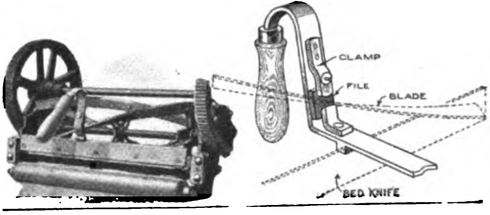
An important adjunct of the motor service of the United States Army consists of motor-truck trailers especially equipped to serve as complete tire-repair shops. A number of these outfits were shipped to France for service along lanes of travel leading to the front. That their use would eliminate costly delays in making repairs while the armies were moving forward rapidly, is obvious. Each conveyance is 13 ft. long and of five tons' capacity, and mounted on each is a tire press, workbench, etc. The working platform is enlarged by letting down hinged side leaves which can be supported level with the floor by chains. A complete set of tools necessary to do repair work is carried with each outfit. The trailer is built so that either end can be drawn first.



Five-Ton Auto Trailer Equipped as a Tire-Repair Shop for Use by the American Forces in France: A Workbench, Tire Press, and a Complete Set of Tools are Included in the Outfit. Either End of the Trailer can be Coupled to the Truck Pulling It

LAWN-MOWER SHARPENER HAS ORIGINAL FEATURES

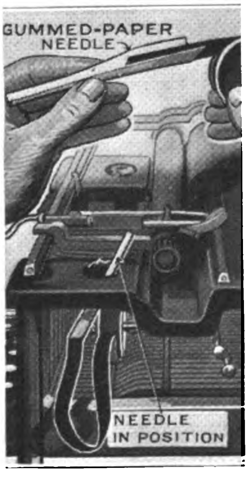
Special merit is claimed for a new lawn-mower sharpener on the ground that the blades sharpened with it are made to conform to irregularities, if any, that exist in the bed knife, so that they cut clean the full width of the mower. The sharpener consists of a steel bar with handles at each end and having a V-shaped bend near one end. On one side of the "V" a file is attached and near it is a foot, or guide. The mower to be sharpened is placed with its roller on the edge of a bench, while the handle rests on the floor. The sharpener is then inserted under the reel with the file against one blade and the guide on the bed knife. A keen edge, which will fit closely to the bed knife throughout its length, is obtained by moving the sharpener back and forth.



Lawn Mower in Position for Use of the Sharpener Which is Drawn Back and Forth on the Blade, with the Bed Knife Serving as a Guide

TYPEWRITER-RIBBON NEEDLE MAKES THREADING EASY

A handy office accessory, enabling a typewriter user to thread a machine with a ribbon more easily, consists of a gummed strip of rather stiff paper which is tapered at one end. After moistening the gummed side of the needle, the wide end is folded about the end of the ribbon. The latter can then be wound onto the spool without soiling the hands, and in less time than is usually required to thread a machine.

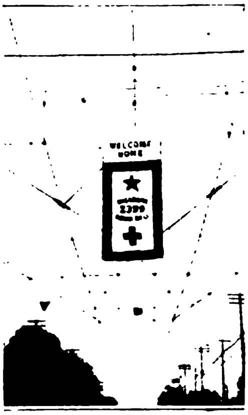


TINY GALLEY OF SUBMARINE HAS ELECTRIC STOVE

City flat dwellers whose "collapsible" apartments are supplied with cupboardlike kitchenettes have, in the popular vernacular, nothing on seamen who man submarines. Scarcity of space in a submersible permits the installation of only a tiny galley, which, in turn, is equipped with an undersized electric stove. Among other reasons, electricity is employed for cooking purposes in order that the air in a submerged craft may not be needlessly vitiated. In former days when the underwater boat was more of a novelty than it is now, no means were provided for the preparation of meals, and it was necessary, therefore, that cold food be eaten.

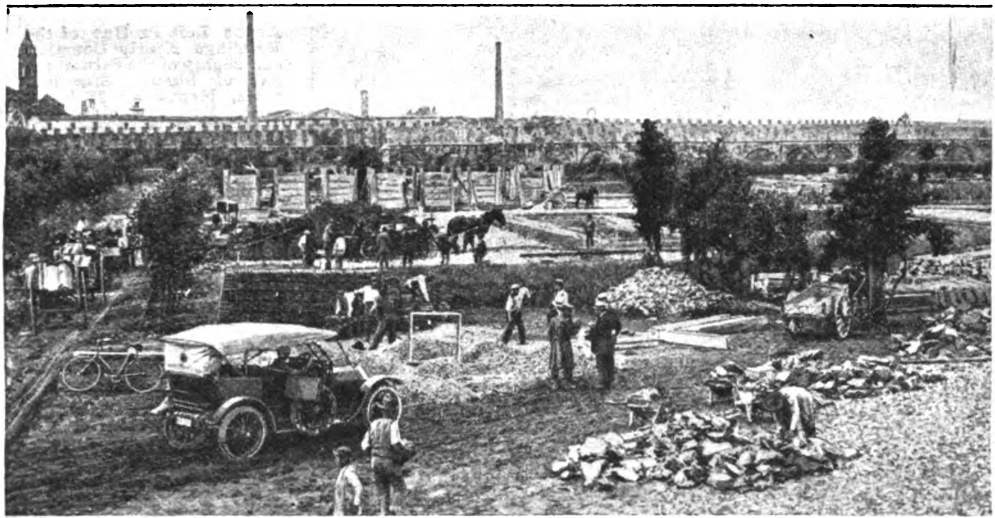
SPECIAL BANNERS WELCOME CITY'S SOLDIERS HOME

Over street intersections on all thoroughfares in Pasadena, by which returning soldiers and sailors might enter that city, have been hung special welcome banners. These resemble the conventional service flag and above each are the words, "Welcome Home." The flags bear a star, a red cross, the words "Pasadena Honor Roll," and "2,399," which is the number of Pasadena men in the service.

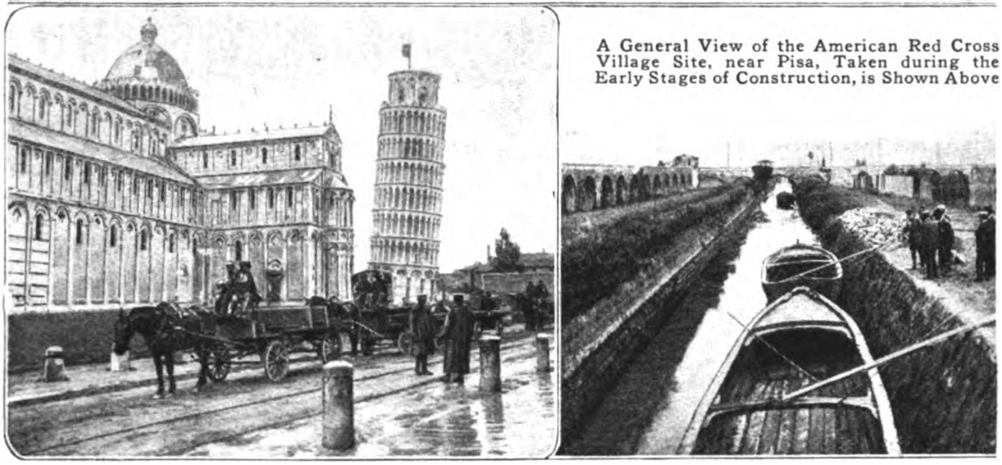


VOLTAGE OF EARTH CURRENTS AFFECTED BY THE TIDE

Because a difference of potential between gas and water-service mains was observed by an experimenter at St. Louis Observatory, on the island of Jersey, in the English Channel, studies were undertaken to prove the theory that the electric action moved in "tides." It was discovered that the mean electromotive force of .1 volt varied from maximum to minimum twice in 25 hours, solar time, corresponding with the tides of the sea, and therefore, secondarily, with the action of the moon. Maximum voltage was reached two hours before low tide with perfect regularity.



A General View of the American Red Cross Village Site, near Pisa, Taken during the Early Stages of Construction, is Shown Above



PHOTOS BY COURTESY OF THE AMERICAN RED CROSS

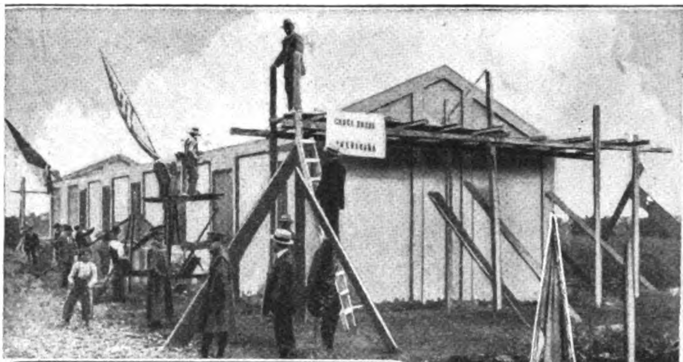
At the Left Are Loads of Building Material for the Village, Passing the Famous Leaning Tower; and at the Right, Canal Barges Used in Transporting Stone

AMPERES NEEDED FOR MOTOR TOLD BY ELECTRIC SCALE

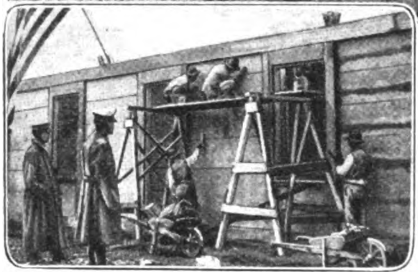
The number of amperes required by an electric motor, when the horsepower and voltage are known, is quickly indicated on a calculating scale simply constructed of cardboard and celluloid. On a square paper table vertical ruled lines read in horsepower, horizontal lines in amperes. A straightedge pivoted at one corner is graduated in volts. The meeting point of the known voltage and horsepower lines, when the straightedge is swung on the scale, indicates the required amperage. Separate arcs on the scale measure alternating current, and an additional scale may show the size of conductor needed.

AMERICANS REAR MODERN TOWN NEAR PISA FOR REFUGEES

A suburb of 90 or more concrete buildings, sanitary and up-to-date in every particular, has been completed in quick time by the American Red Cross, on the outskirts of the ancient city of Pisa, Italy. It stands as a monument to America's generosity and ability promptly to meet a great emergency. The dwellings, together with the macadamized streets, sewers, electric lights, and other modern improvements, occupy a site not far from the famous leaning tower. A few months ago this land was nothing but vineyards and fields of corn. The village has been built to provide homes for artisans and their



At the Left Is One of the Buildings Nearly Completed. Eighty of the Structures Are of Similar Size and Style, Measuring 18 by 72 Feet. Each is Divided into Nine Rooms



Finishing the Walls: The Structures Are Like Barracks but Each is Made More Homelike by an Allotment of Ground for a Garden

Italian Workmen at the Entrance to 30-Acre Tract on Which They Built the Red Cross Village: Note the American and the Italian Flags Either Side of the Gateway, Typifying the Cordial Relationship That Existed

Unloading Slabs from the Railway Cars for Use in Constructing the Model Village: The Workmen Employed on This Interesting Project Were Italians, While the Supervising Officers Were Representatives of the American Red Cross. A Splendid Spirit of Coöperation Characterized the Work

PHOTOS BY COURTESY OF THE AMERICAN RED CROSS

families who fled from Venice during the war and since have not been in a position to return. Eighty of the structures are similar in style, measuring 18 by 72 ft., and contain nine rooms each. The village will accommodate 2,000 persons. At its center are several public buildings, a square with a drinking fountain, playground space, etc. The labor was done by Italians under the supervision of Americans. Garden plots have been set aside for the occupants of the cottages.

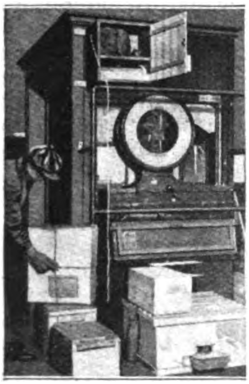
LONG CONCRETE PIPES CAST IN SIMPLE MOLD

Two iron pipes, one nested inside the other, form the mold for a new European process of making long, thin pipes of concrete. The prepared mixture in a cylindrical stirring chamber is forced by compressed air down into the annular space between the iron pipes, whose diameter may be of any size to produce the desired thickness of wall.

LONDON-TO-SYDNEY AIR ROUTE PLANNED BY AUSTRALIANS

Considerable interest has been aroused by a report that commercial and financial interests in Australia are giving serious study to the problem of linking Australia and London by an aerial transportation line. Although it is not known on just what basis service would be maintained, it is nevertheless significant that a company has been formed that will provide the financial backing for surveying an air route to London. This, as planned, would proceed by way of Sydney and Port Said. The complete plan contemplates extension of the system to various parts of the British empire, once it is established and demonstrated as physically and commercially practicable for permanent maintenance.

PACKAGE-REPAIR OUTFIT IN EXPRESS OFFICES

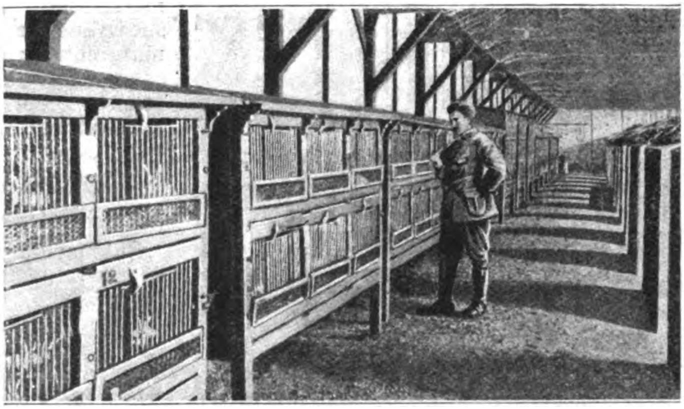


In certain express offices a repair and wrapping kit has been installed above the scales which enables employes to render a much appreciated service in cases where the packages handled have broken open. The outfit is inclosed in a box with a hinged door and includes heavy and light cord, a hammer, nails, wrapping paper, etc. With this material close by it is comparatively easy to put a bursting package in shape for shipment, without delaying its delivery.

ℭOpportunities for deaf-mutes have been found in the rubber-tire industry, and in one plant which employs a large number they are reported to be among the most expert workmen.

FRENCH EX-SOLDIERS LEARN TO RAISE RABBITS

An unusually interesting after-the-war undertaking in France is the work being done on a farm, under the management of the Union of Foreign Colonies, to reeducate soldiers in agricultural pursuits. Here considerable space is devoted to the raising of poultry and rabbits, the latter being valuable chiefly for their fur, which is much in demand as a substitute for blue fox, chinchilla, angora, etc. The rabbits on this farm are housed in sanitary hutches of special design, resting on supports a few inches above the ground and arranged in long rows, with a south exposure, beneath a shed. The cages are made in groups of six or nine and are placed in two or three tiers. Each compartment measures approximately 2 by 1½ by 3 ft. and is zinc-lined to half its height. Wire netting across the front supplements the light iron bars and prevents the food from being thrown on the ground. Rabbit and poultry raising is work to which many crippled and invalided soldiers can adapt themselves.



BY COURTESY OF LA NATURE, PARIS

Rabbit Hutches on a Farm in France Where French Ex-Soldiers are Learning to Raise Rabbits: The Pelts of the Latter are Sold as Substitutes for Blue Fox, Angora, and Other Furs

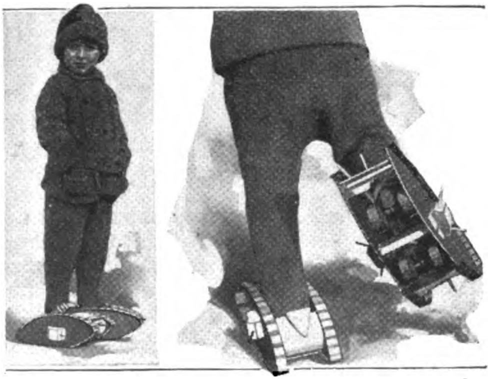
BARNACLES PROVING POPULAR AS A SEA FOOD

The barnacle, commonly regarded as a pest, is now being converted into soup and other forms of food, having taken its place beside clam chowder in various cafés and hotels in southern California. The piling of the Pine Avenue pier, at Long Beach, is incrusted with more than 100 tons of these and other sea creatures, which are being stripped off and will be utilized for food. Here and at San Pedro canning plants are arranging to put up barnacles in large quantities. As the demand for barnacle soup increases, canning plants propose to contract for the creatures removed from the bottoms of ships.

Harvesting Barnacles and Mussels for Soup from the Piling of a Pier at Long Beach, California

INFLUENCE OF WAR REFLECTED IN CHILD'S ROLLER SKATES

It is a far cry from the world war to a child's roller skates, but the influence of the one has placed its mark on the other, the armistice season and approaching peace notwithstanding. All of which is one way of calling attention to the fact that roller skates of the latest approved model are fashioned after the style of British fighting tanks. Novelty always being uppermost in the juvenile heart, it matters not that the new skates are a bit snowshoelike in size. Appearance is the main consideration, and grace of no consequence. The new skates are like all others except that they are surrounded by tanklike bodies made of light sheet metal.



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Something New for Gladdening the Childish Heart: Tanklike Roller Skates That in Appearance Closely Resemble Their Deadly Prototype

SOUTH AMERICAN CABLES WILL BE EXTENDED

Submarine cable communication between Buenos Aires, Argentina, and Montevideo, Uruguay, and between Rio de Janeiro, Brazil, and Cuba is provided for by grants of the South American governments to a cable company which already has the necessary material on hand or contracted for early delivery. The Brazil-Cuba cable will touch at places in northern Brazil, and possibly in the West Indies. Guantanamo, Cuba, is already connected by two cables with New York City and Colon, Panama.

MUSKRAT FARMS MAKE MONEY FOR SWAMP-LAND OWNERS

With every other girl wearing a fur coat, and a majority of the fur so used coming originally from the back of the humble muskrat, it is not surprising that a steady market prevails for first-class muskrat pelts at $1.00 to $1.50 each. Marshes favored by these animals become ready-made fur farms, highly profitable when, as sometimes happens, the crop of "swamp rabbits" runs from 50 to 100 to the acre each season. Marshland not being considered valuable, the rat farmer's investment is frequently quite small in relation to his returns. A 900-acre marsh on Chesapeake Bay, sold for less than $200 a few years ago, is now reported to bring its owner an annual gross income of more than $10,000, requiring the services of several trappers to harvest its crop of muskrat and mink.

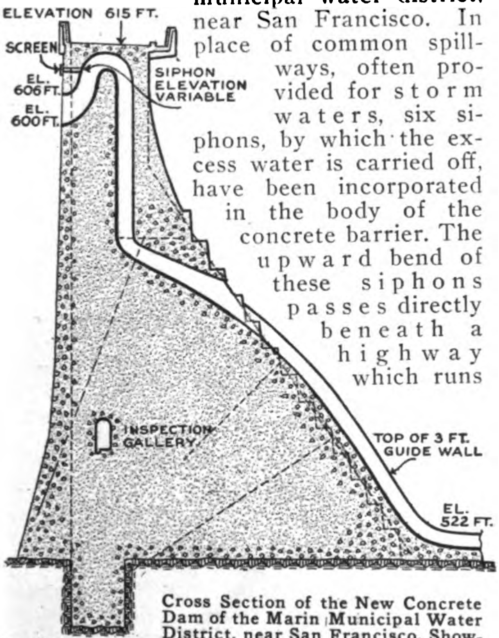
¶Several hundred thousand pounds of high explosives, including T. N. T. and picric acid, belonging to the French and Italian governments, have been ordered taken out to sea from Perth Amboy, N. J., and sunk, since practically none of this material can be used for any purpose other than the making of munitions.

SHIPBUILDING IN AMERICA REACHES PEAK IN 1918

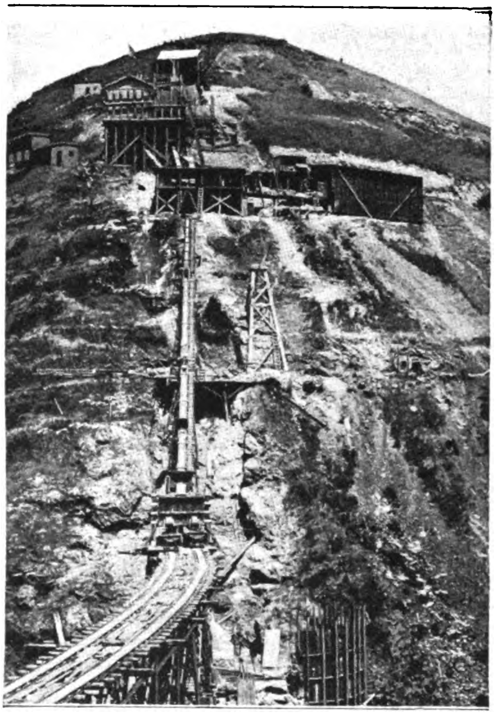
Just before the armistice cast its relaxing influence upon war industry American shipyards were approaching a monthly output of 400,000 gross tons. The American shipbuilding record for all of 1918 was 1,882 merchant vessels of 2,721,281 gross tons, officially numbered by the Commerce Department of the Bureau of Navigation and including a small amount built for the French. All but 124,255 gross tons were seagoing ships. The total seagoing tonnage of 2,597,026 was comprised of 1,861,321 gross tons in steel ships, and 735,705 credited to wooden ships. While December naturally showed a marked falling off, the 1918 total compared with 1,699 ships in 1917; but the 1918 tonnage more than doubled the 1917 figure of 1,034,296. In seagoing ships 1918 produced a fleet of 821 against only 279 for the previous year. These figures include both steel and wood vessels, with the majority always of steel.

MATERIAL FOR CONCRETE DAM HANDLED BY GRAVITY

Two features lend particular interest to the new concrete dam of the Marin municipal water district, near San Francisco. In place of common spillways, often provided for storm waters, six siphons, by which the excess water is carried off, have been incorporated in the body of the concrete barrier. The upward bend of these siphons passes directly beneath a highway which runs along the top of the dam. The other feature has to do with the economical handling of materials used in construction. Advantage was taken of a high hill, at one end of the dam, from near the top of which rock was quarried for the concrete. A crusher for breaking up the rock was installed not far below the quarry, and from here the stone was fed by gravity to a mixer somewhat lower down. The wet aggregate was then sent down to a bunker on a level with the crest of the dam, where dump cars were filled which distributed the material as needed.



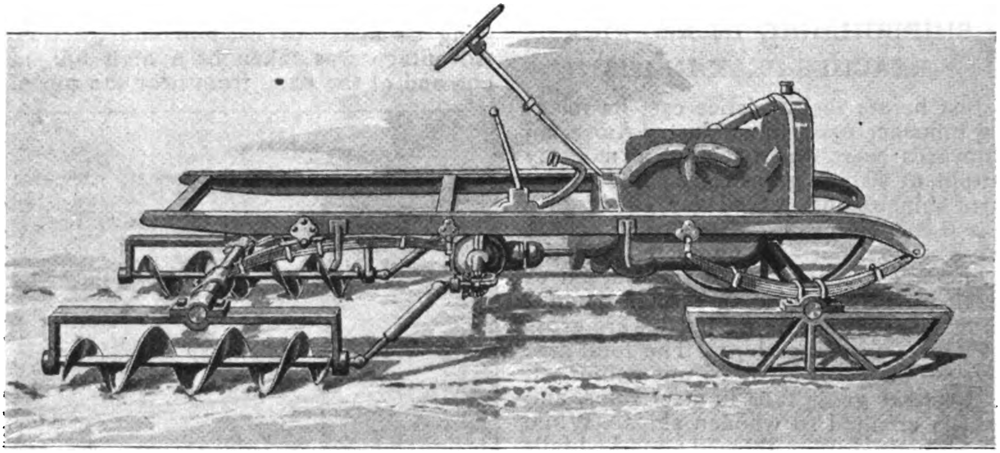
Cross Section of the New Concrete Dam of the Marin Municipal Water District, near San Francisco, Showing One of the Six Siphons Built into the Structure



View, from the Dam Site, of the Hill Where the Rock was Quarried: On the Slope Are the Crusher, the Concrete Mixer, and the Chute Leading to Bunkers near the Base

PARIS TO GREECE BY NEW RAILWAY LINK

By May, 1919, through trains from Paris to Athens will be running over the railway line completed two years ago but denied to international use by the war. Trains leaving Paris Saturday noon will arrive in Athens the following Tuesday morning, passing through Milan, Venice, Trieste, Agram, Belgrade, Nish, Uskup, and Larissa. Anglo-Indian and other far-eastern mails and passengers will be carried. A seven-mile extension from Athens to Piræus will greatly increase the importance of that port.



An Automobile Converted into a Motor Sled by the Substitution of Runners for the Front Wheels and Spiral Propellers for the Rear Wheels: The Rear Axle is Here Installed Just Back of the Transmission Case, and Power is Conveyed to the Propellers through Diagonally Placed Shafts Having Universal-Joint Connections at Either End

SUPPORT MILITARY BRIDGE BY HUMAN PIERS

Military bridges are of all the varieties suggested by the demands of expediency, but the one illustrated here is unusual mainly in its supports or "piers." In one of the last battles of the British troops, the immediate necessity of crossing a stream under fire was met by marching a number of men into the water, where they supported a broad plank upon which their company made the crossing.

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British Troops Crossing Stream under Enemy Fire on Plank Bridge Upheld by Their Comrades

SPIRAL PROPELLERS MAKE ANY CAR A MOTOR SLED

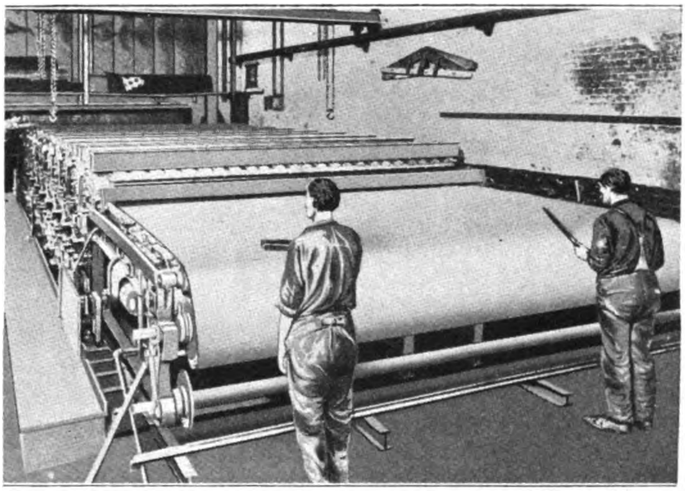
An attachment recently patented in this country and Canada, with which any automobile can be converted into a motor-driven sled, represents a decided departure from the conventional type of propelled vehicle with runners. Ordinary runners are substituted for the front wheels of the converted car, while at the rear are two propellers resembling spiral conveyors. The rapid revolving of these members in the snow gives the car its speed. Power is conveyed through the rear axle and differential, which are installed directly behind the transmission case. At each end of the axle is bevel-gearing through which power is transmitted to the propeller shafts. The screws are made smaller in diameter at the ends than in the center so that they will more easily pass over obstructions. Each shaft is composed of two sections, one telescoping in the other, permitting the propellers to adjust themselves to unevennesses in the road without loss of power.

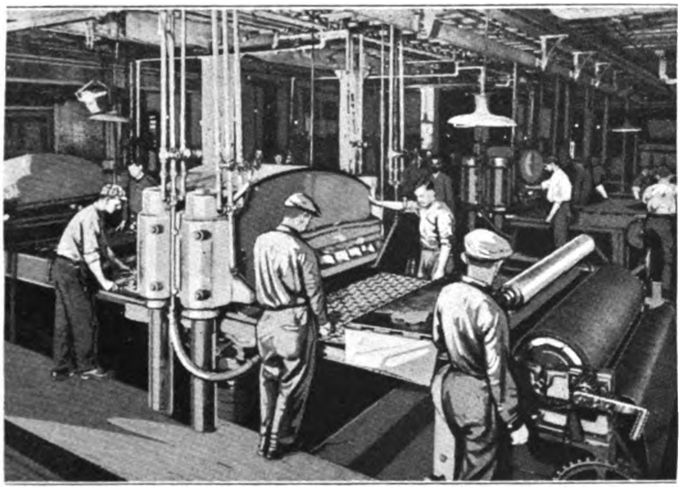
TUNGSTEN CONTACT POINTS NEW PLATINUM RIVAL

Among the new uses for tungsten an important one to the electrical trade is its effectiveness for contact points. Tungsten contacts must be short because of their high resistance, and in unusual cases need artificial cooling. They are fastened to their springs by spot welding. The process can be used for the smallest contacts, and is reported to be entirely satisfactory as a substitute for platinum.

SPECIAL MACHINES FOR MAKING LINOLEUM

Ingenious machinery is required to make inlaid linoleum so that the sections of various colors are united into a single solid mass and at the same time the lines of the pattern are sharply defined. Linoleum is made with a backing of canvas, or burlap, on which colored "dough" is pressed and dried in conformity with the desired pattern. This dough consists of oxidized linseed oil mixed with finely ground cork. The machine by which the dough is applied is provided with a metal pattern that outlines the design to be made, by means of thin vertical partitions. The backing is drawn into place under this pattern and then the latter descends on it. Each section of the pattern is connected with a reservoir containing thick dough of the proper color, which is forced through the pattern onto the backing, after which the pattern lifts and the backing passes on a few feet. Then the process is repeated. Tremendous pressure and heat cause the parts of the design to fuse. Finally the linoleum is dried, or "cured," for two or three weeks. In making cheaper grades of linoleum the pattern is printed with a machine resembling a printing press, the functions of the type being performed by wooden blocks arranged to reproduce the desired pattern.


Running Linoleum, Not of the Inlaid Sort, through a Machine Like a Printing Press, in Which Wooden Blocks Forming the Pattern Take the Place of Type

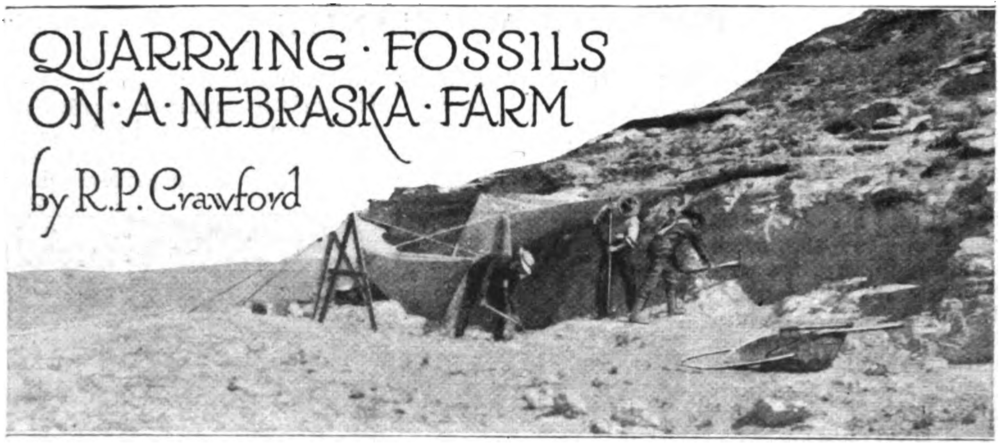

Making Inlaid Linoleum: A Metal Pattern is Pressed Down over the Canvas or Burlap Backing and Then Dough of Various Colors is Forced into the Compartments That Compose the Pattern

ELECTRIC CARD SORTER DEALS FARM FACTS

Agricultural information on cards in the Connecticut state librarian's office can be quickly obtained by pressing the button of an electric sorting machine, such as has long been used by railroads, banks, and the government. Facts collected by farm-census enumerators in five counties were carefully carded and the electrical machine installed. Now a farmer who is interested in a supply of seed corn or oats, some young pigs, a grain binder, or any other agricultural necessity, need only go to the library and throw a switch, and all the available information will immediately be laid before him. Forty separate subjects are covered by the data.

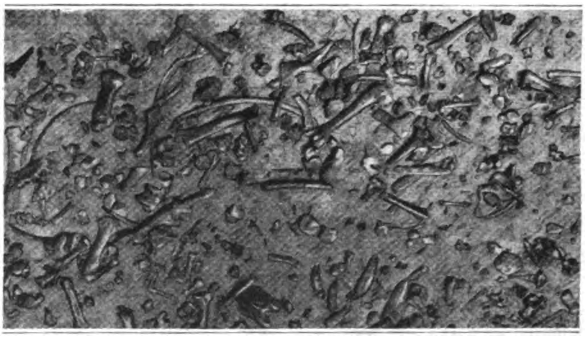
QUARRYING · FOSSILS ON · A · NEBRASKA · FARM

by R. P. Crawford



This View Well Illustrates the Conditions under Which the Fossil Collectors Work on the Cook Farm in the Northwest Corner of Nebraska, Now Known to Be Rich in Remains of Prehistoric Animals. Museum Men from Many Parts of the Country have Made Excavations Here

WHERE do the museums of the country get their strange and curious skeletons of prehistoric animals? If the skeleton is a "dinohyus" or a "moropus," one may be quite sure that it came from the farm of James Henry Cook in the northwest corner of Nebraska; and the chances are almost equally good if the specimen happens to be a saber-toothed cat or a many-toed horse, or almost any of those queer animals that belong to the early Miocene period. Most ranchmen and farmers are quite content to raise the ordinary sort of stock, but here is a ranch that is most widely known because of its output of prehistoric animals. For more than a decade paleontologists from the great universities and museums of this country have made regular trips to these fossil quarries.

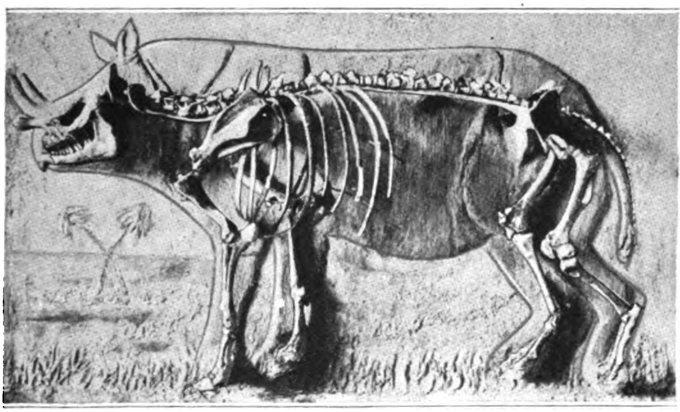


This Slab, Which Measured Only Four by Seven Feet, Shows What a Variety of Fossils are Found in Certain Layers of Rock, near the Bases of the Hills

The Cook farm and ranch, located close to the Wyoming line, comprise some 15,000 acres. On the eastern edge of the ranch the Niobrara River has laid bare two hills, from both of which scores and scores of fossil skeletons have been quarried. In the summer it is no uncommon occurrence for representatives of half a dozen eastern institutions to pitch camp near these hills and spend several months digging out the fossil bones which, when worked over in the museum, form the queer-looking skeletons. The University of Nebraska, under the direction of Prof. E. H. Barbour, early began work on the fossil deposits, and Yale, Columbia, Carnegie Museum, and the American Museum of Natural History are some of the larger institutions that have followed suit. One summer 21 collectors were at work on the ranch.

The fossil bones are found in layers near the bases of the hills. If one has seen corn stored in a crib, he can visualize the manner in which the bones are piled in the layer. A slab, about 7 ft. long and 4 ft. wide, was taken out bodily by investigators from the University of Nebraska. It is a piece of rock literally packed with fossil bones of all sizes.

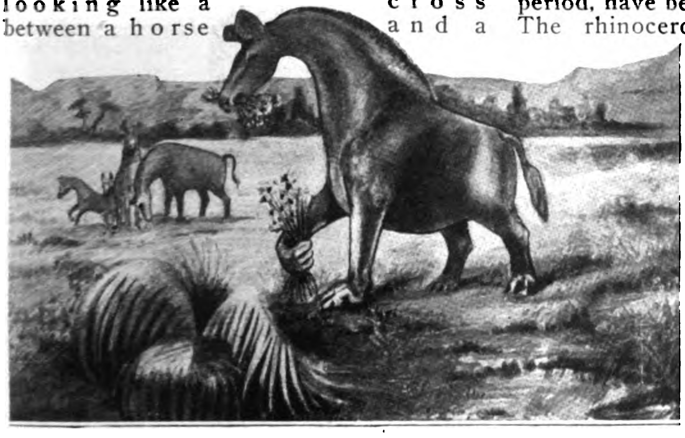
Extensive quarrying operations have to be carried on, however, in order to get at the bone beds. Fifteen or 20 ft. of rock is first blasted away with dynamite, and horses and scrapers are then used to clear off the shattered rock. When the top of the bone layer is reached, the scientists begin work with pick and chisel. Large blocks of bones are pried out and each is marked so that it can be fitted into the right place later on in the museum. These slabs are wrapped in strips of burlap, which have been dipped in plaster of Paris. A strong jacket around the bones is thus secured. The blocks are then packed in boxes stuffed with hay, and are hauled overland by horse and wagon to the railway station. Very little effort is made to separate the individual bones from the rock at the quarry, practically all of this more difficult work being left for the museum.


Fossil Skeleton of a Rhinoceros Found on the Cook Farm, Showing the Method of Mounting Employed by the University of Nebraska

One of the remarkable discoveries in these beds was that of the dinohyus, or giant hog, but two specimens of which are known in the world, one in the museum of the University of Nebraska and the other in an eastern museum. The size of this prehistoric porker may be judged from the skull and jaw, which together are 38 in. in length. The fore leg in the museum of the University of Nebraska measures 7 ft. from the tip of the toes to the top of the great shoulder blade. This animal resembled, on a larger scale, the wild boar.

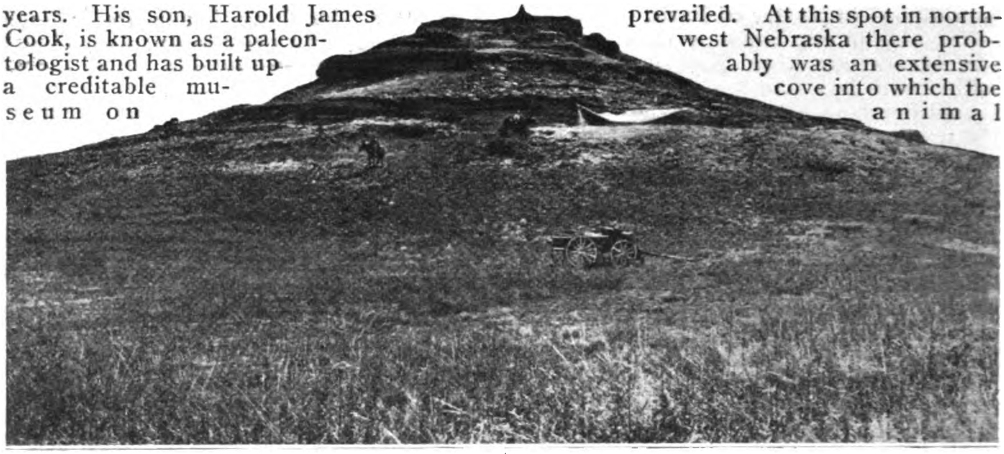
The Skull and Jaw of an Animal of Great Size Resembling a Boar: The Fossil Shown Measures 38 Inches Long

Another discovery of interest is that of the moropus, certainly a queer sort of animal, looking like a cross between a horse and a rhinoceros. In short, it appears to have had the body of a rhinoceros and the head of a horse, and, in addition, claws on its feet. Its skull is practically the same size as that of a horse, and the animal probably stood 7 to 8 ft. high at the shoulders. Related specimens of this curious beast have been found in Europe, but it is believed that this spot in Nebraska is the only place in North America where complete skeletons are found. Eastern museums have been unusually eager to secure specimens of the moropus, and practically all those in the metropolitan institutions came from this spot in Nebraska.


A Scientist's Conception of a Prehistoric Animal Which Was Half Horse and Half Rhinoceros

Countless numbers of fossil skeletons of the rhinoceros, together with cats and dogs of the Miocene period, have been unearthed on the ranch. The rhinoceros is the most common. Sometimes 25 skulls are found in a cubic yard of rock. A new method of mounting these specimens has been originated by the University of Nebraska. It consists, as shown in one illustration, of making a plastic background of cement, in front of which the skeleton is mounted. The background shows in low relief the proportions of the living animal.

Captain Cook has given the scientists the freedom of his ranch for many years. His son, Harold James Cook, is known as a paleontologist and has built up a creditable museum on the ranch. The origin of the fossil deposits is explained by Professor Barbour, the state geologist. At the time the bones were laid down, river and lake conditions prevailed. At this spot in northwest Nebraska there probably was an extensive cove into which the animal skeletons were washed. In time they were covered with mud and sand, which later formed rock, thus preserving the remains for posterity.



One of the "Bone Hills": The Canvas Indicates Where Quarrying is Carried On. It is Believed That at One Time Water Covered Part of This Region and That the Place Where the Bones are Found Was Once a Cove into Which the Skeletons were Washed

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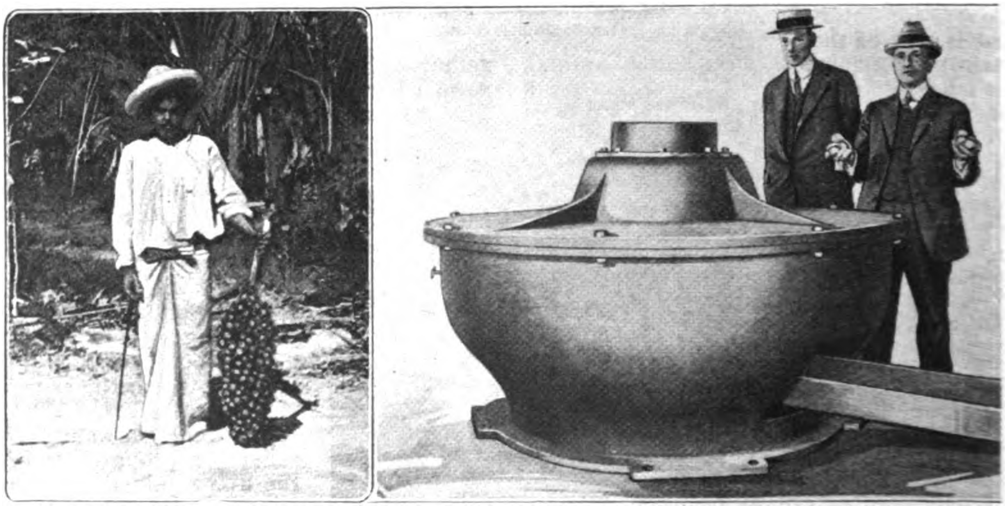
BIG MACHINE CRACKS NUTS BY CENTRIFUGAL FORCE

A nut-cracking machine weighing 5,500 lb. has been built in Los Angeles for use in Guatemala, Central America, in cracking coquito nuts, from which a valuable oil is extracted. These nuts grow wild on a variety of coconut palm and are about the size of a large black walnut with its shell on. The inside hull of the coquito nut is about ¼ in. thick and so hard that a pressure of several hundred pounds is required to crack it. The machine, instead of crushing or grinding the nuts as might be supposed, cracks them by centrifugal force. The nuts are fed into a drumlike casting, 6 ft. in diameter, where they strike a swiftly revolving wheel that hurls them with terrific force against breaker blocks that line the drum. This



Left: A Bunch of Coquito Nuts. A Tree will Bear from Six to Twelve Bunches of These Nuts, Each Bunch Weighing from 60 to 80 Pounds. Right: Drum of the Machine Which has been Built to Crack Coquito Nuts by Centrifugal Force shatters the nuts and the broken pieces fall into a discharge pipe, equipped with fans that separate the kernels from the hulls. It is estimated that the machine can crack 10 tons an hour. The region where it will be employed has great numbers of these coquito palms. The kernels of the nuts are about 70 per cent oil—a product used in making soaps, candles, cosmetics, and the like.

WILD FOWL FIND SANCTUARY ON LOUISIANA LAKE

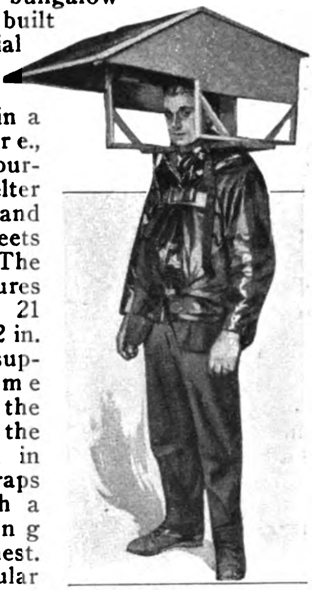
A stretch of water two miles long and a mile wide, with 1,000 acres surrounding it, constitutes Louisiana's first offering of a permanent refuge for wild life of all kinds. Lake Peigneur, near New Iberia, in Louisiana's southern tier of counties, has been turned over to the state department of conservation by its owners, with the option of purchase after ten years. Agents of the department will fence and guard the preserve, which will be stocked with quail, grouse, wild turkeys, and other game, all of which will be supplied with food and protected from hunters and natural enemies. Dredging and damming operations in the cypress swamps have provided home sites for herons, egrets, and other tree-nesting birds, while selected shrubs and trees attract the migratory fliers. The department of conservation holds contracts with riparian-right holders to allow no shooting or trapping on their land for ten years.

PONDEROUS ARMY TRACTOR MAKES LONG CRAWL

Though rated at only three miles an hour, an 85-hp. tractor of the endless-tread type "ran" into Detroit just six days after it left its factory 480 miles away, its engine running continuously during that time. From Detroit it was ordered to proceed overland to the army proving grounds at Aberdeen, Md. Varied road conditions proved unable to stay the steady progress of the big crawler. The machine was driven by a crew consisting of a lieutenant and four enlisted men.

¶Warnings from the United States Weather Bureau issued for the benefit of live-stock interests saved over 100,000 new-born lambs in the San Francisco district in one month, and protected great numbers of sheep by causing postponement of shearing.

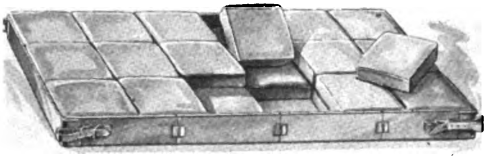
"BUNGALOW HAT" KEEPS RAIN OFF CHECKER'S RECORDS



A wide-spreading head covering, chiefly of wood, which his fellow workers have nicknamed a "bungalow hat," has been built by a material checker, employed mainly out of doors, in a Portland, Ore., shipyard. Its purpose is to shelter the wearer and his tally sheets from the rain. The device measures 35½ in. long, 21 in. wide, and 12 in. high. The supporting frame rests on the shoulders and the whole is held in place by straps connected with a belt passing around the chest. A perpendicular wooden strip extending down the wearer's back also helps to steady the novel headgear.

SANITARY HOSPITAL MATTRESS MADE IN SQUARE SECTIONS

A new type of mattress particularly suited to hospital needs is made in sections about 10 in. square, which are held together by a light framework. The two principal advantages of this construction are that soiled sections can easily be removed for cleaning and, in case the patient is apt to develop bed sores, relief can be given by removing the squares immediately beneath the sensitive portions of the body. The squares being interchangeable, they can be rearranged so that all get about the same wear.



A Mattress Made in Square Sections and Especially Suited to Hospital Needs: Any Portion can be Easily Removed for Cleaning, or to Add to the Patient's Comfort

REVIVING HANDICRAFTS IN AMERICA

By W. D. GOODWIN

NEW opportunities are offered to men and women to become wage earners in their own homes, independent of factory and industrial conditions, by the establishment of hand-loom industry and textile studios, in New York City.

Tapestry Weaving on a Hand Loom: At Present There Are Only About 16 Professional Tapestry Weavers in the United States

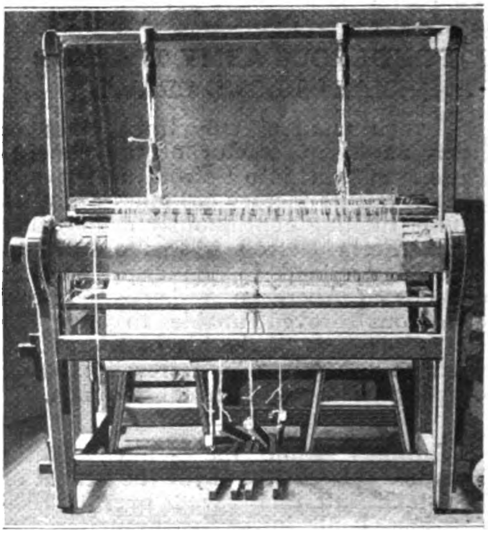
There are maintained in these studios, schoolrooms, loom rooms, and an experimental dyeing plant. French, Swedish, Italian, and Russian looms are used, as well as a specially constructed loom for home uses. Expert tapestry weavers are employed, who act both as teachers and producers. When necessary, the home looms are made to meet the needs of many individuals, thus enabling cripples, or those who have been maimed in the war or in industrial pursuits, to take up productive work and become wage earners. Students readily acquire skill in weaving simple designs and gradually progress to the more complicated fabrics, all of which possess artistic merit as well as serve many useful purposes.

This is the first attempt to establish, on a large scale, such an enterprise in the United States. Its patrons and promoters feel confident that they are laying the foundation of what is to become a great industry.

The objects and purposes of the undertaking are to supply the existing demands for beautiful handmade tapestries; to revive and foster the art of hand-loom weaving in American homes; to teach and train people who are not wage earners to become skillful in making ornamental and serviceable textile fabrics; to furnish employment to those who desire to take up such work as a profitable occupation and means of livelihood amid pleasing surroundings.

There are many men and women in the United States who are not wage earners, perhaps through no fault of their own, but who are willing, capable, and industrious. To the crippled soldiers, or those who have become more or less incapacitated from any cause, as well as to those who are in good health but whose time is not fully occupied, opportunity is now presented to engage in productive labor under ideal conditions, by turning their leisure hours to good account. This employment affords people an incentive to develop their talents, as, for instance, by more closely associating weaving with its allied arts in connection with textile needs, architecture, decorations, and sculpture.

In these studios instructions are given in weaving, designing of hand-loom fabrics, tapestries, needle-point embroideries, guimpes, tassels, and the copying of antique fabrics of all periods; the making of unusually artistic costumes for private or theatrical use, their fabrication being

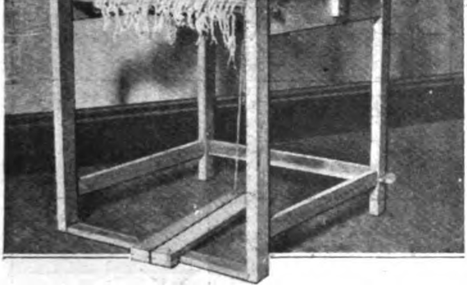


Swedish Hand Loom for Making Cloth 36 Inches Wide: By Changing the Reeds through Which the Threads Pass Fine or Coarse Material can be Produced

fully explained and made attractive to the pupils. A course of 10 lessons of two hours each is given, which may be received either in the morning or afternoon. Besides instruction in the subjects mentioned above, dyeing of threads is also taught; the free use of looms and all materials required being supplied by the studio.

Full-size drawings representing subjects to be produced are supplied in colors, in many instances by people who order special articles made of textile materials. These designs serve as working models for the weavers when placed underneath the warp threads of the loom, where they may be easily seen and followed. The ability to use the fingers quickly, match colors correctly, and thus turn out work rapidly, contributes much toward the weaver's success in fabricating the various designs. A far greater demand exists for handmade tapestries than can be supplied.

At the present time, there are only about 16 professional tapestry weavers in the United States, and it may therefore readily be seen that a splendid opportunity presents itself for the constant employment of those who become skillful in the art of constructing such fabrics.

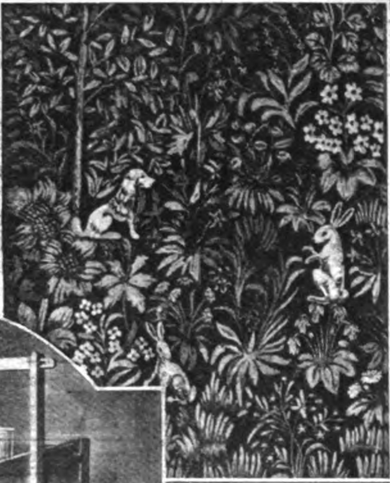


This Type of Loom can be Fitted with Various Attachments for Weaving Linen, Silk, Cotton, Homespun, Tweed, and Tapestry

The wonderful handicraft imported into the United States has been developed in European homes, but there is no reason why work of equal merit and design should not be produced here, which will be more keenly appreciated by the purchaser because "made in America."

By providing adjustments and additional parts for the old pattern looms, those for the home are made adaptable for using many different fabrics, such as linen, silk, cotton, homespun, tweed, and tapestry weaving. These modernized hand looms are capable of turning out fabrics 27 in. wide, are made of light but strong materials, and are easily dismantled and reassembled.

A Small Hand Loom being Used to Make a Girdle: The Skilled Operator Makes Up Her Design as She Weaves



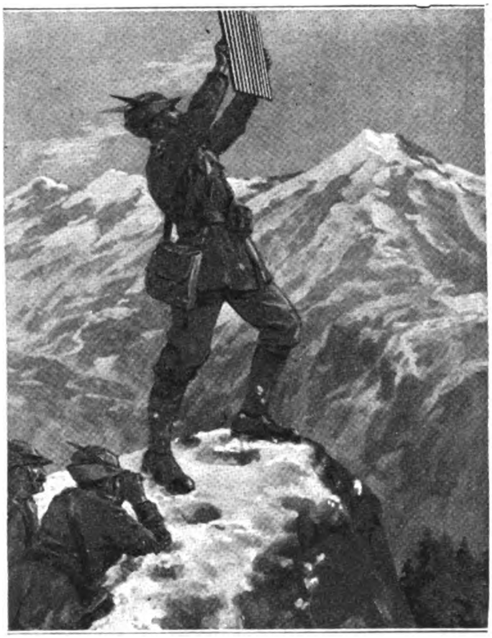
Part of a Screen Made in a New York Textile Studio

This revival of handicraft work, it is believed, will be materially helped by the fact that many people of foreign birth in this country have been trained in similar tasks in their native lands.

HEAT AND COLD ALTERNATE IN TESTING DEVICE

Artificial aging as applied to nickel-steel clock springs, arms of precision balances, thermometer glass, and similar parts demands a periodical variation or oscillation of temperature. This condition may be produced by connecting two relays in circuit with a thermometer column at the desired high and low points respectively. The upper contact turns off the heat, while the lower contact turns it on. The device is also useful in testing building materials.

CURIOUS SIGNALING DEVICE USED BY ITALIAN ALPINI



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Spreading the News of the Armistice from Peak to Peak: An Odd Method of Signaling Used between Italian Alpini Outposts

It seems safe to assert that practically every modern means of long-distance communication was employed in spreading the news of the armistice to soldiers on the various fronts. Perhaps none of the several systems of signaling brought into use on that momentous occasion is more unfamiliar to the average American civilian than that utilized at many scattered Italian outposts high in the snow-covered mountains. The transmitting device is made of stiff accordion-plaited cloth, bearing alternate stripes of red and white. When held loosely, only red is displayed; when drawn tautly, the white is made visible. Handles at each side enable the operator to manipulate the contrivance rapidly and signal by means of a code. Thus it was that the news of the armistice was carried from peak to peak, where little bands of Alpini maintained vigil.

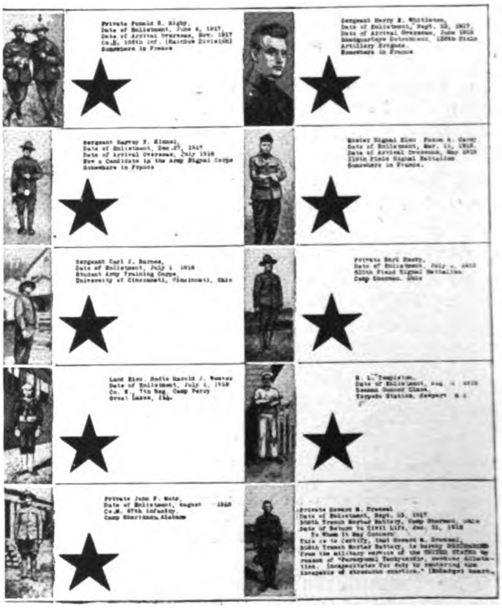
ℂAttention has recently been called to the possibilities of using beryllium in preference to aluminum in certain kinds of construction, because it is so much lighter than the latter metal, and because its strength, it is claimed, is twice as great.

PROPOSE LINERS BE EQUIPPED WITH MAIL-CARRYING PLANES

To improve the transatlantic postal service, the suggestion has been made that mail-carrying liners be equipped with fast-flying seaplanes. Execution of such a plan, it is contended, should hasten the delivery of important correspondence between New York and London, for instance, by 24 hours. A ship, when a few hundred miles from the coast, would dispatch a seaplane with "express" mail, thereby enabling the latter to reach its destination hours earlier than is now possible. In a similar manner service between South America and the European continent could be expedited. Vessels crossing from this side of the Atlantic, for example, could release planes when at points 300 or 400 miles off Lisbon or Gibraltar.

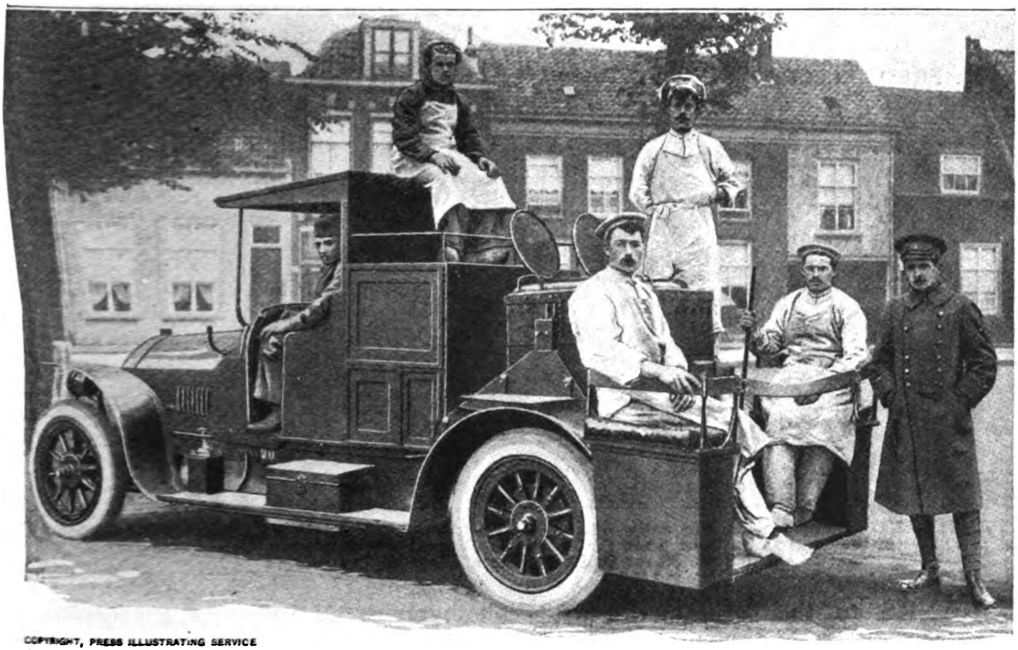
NOVEL ROLL OF HONOR TAKES PLACE OF SERVICE FLAG

Having found difficulty in keeping its service flag up-to-date, a public-utility company in Columbus, Ohio, has substituted for it a large red mat, suitably framed and having a white rectangular center. The latter is divided into 12 sections, 10 of which have been filled with pictures of men in the service, together with summaries of their military records.



The Central Portion of a Telephone Company's Honor Roll: Surrounding This Is a Field of Red, and the Whole is Inclosed in a Suitable Frame

MOTOR-CAR FIELD KITCHENS USED IN DUTCH ARMY



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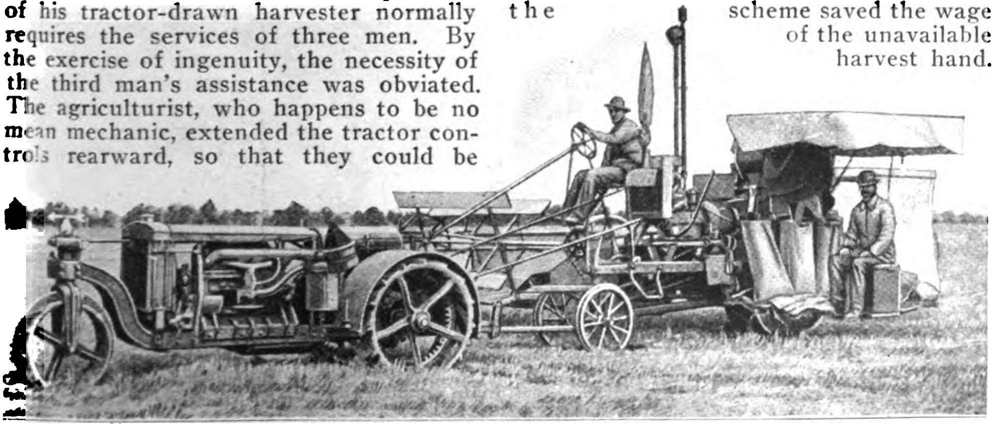
THOSE who think chiefly of wooden shoes when picturing Holland and its people, perhaps do not visualize it as a country with a well-trained army outfitted with such modern field equipment as motor-car kitchens. The assumption seems particularly plausible in view of the fact that our own army has been regularly supplied with such conveniences only a comparatively short time. The photograph reproduced herewith illustrates the type of mobile kitchen with which the Dutch land forces are supplied. In passing, it is not altogether irrelevant to mention that Holland's defense system consists of a militia with strong cadres founded on universal service and that as far back as 1908 the war strength of its first line was 105,000, and that of its second line, or reserve, 70,000 officers and men.

TRACTOR AND HARVESTER OPERATED BY TWO MEN

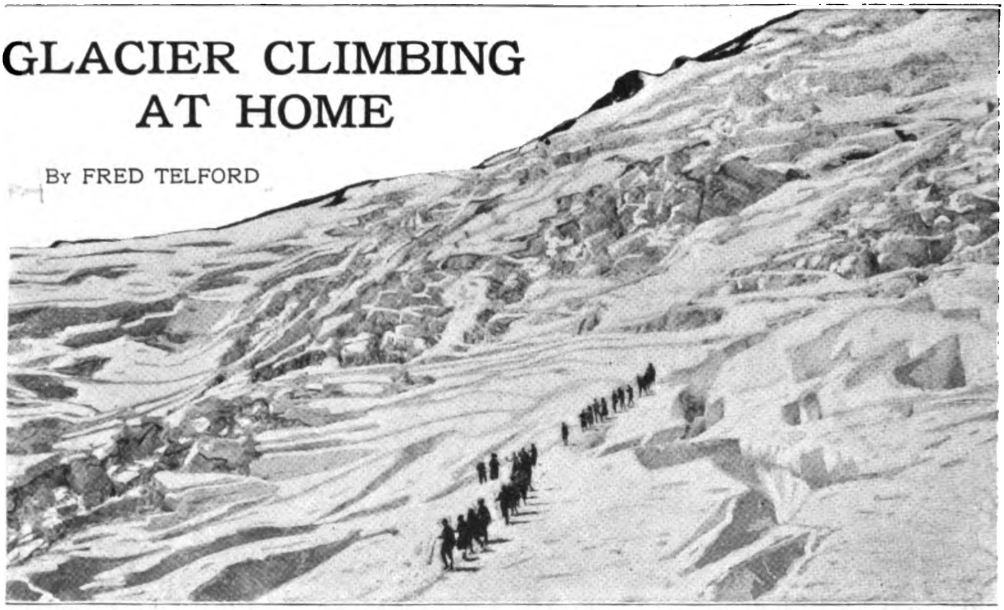
To have labor shortage at the busiest season of the year work to his advantage, instead of against him, was the paradoxical situation that marked a far-western grain farmer's latest harvest. Operation of his tractor-drawn harvester normally requires the services of three men. By the exercise of ingenuity, the necessity of the third man's assistance was obviated. The agriculturist, who happens to be no mean mechanic, extended the tractor controls rearward, so that they could be manipulated from the forward seat of the harvesting machine. Thus provision was made enabling one man to serve at two posts. In addition to meeting the perplexing situation in a satisfactory manner, the scheme saved the wage of the unavailable harvest hand.



Handicapped by Labor Shortage, a Resourceful Farmer, by Extending the Tractor's Controls Rearward, Rearranged His Tractor and Harvester Combination So That One Man could Do the Work of Two

GLACIER CLIMBING AT HOME

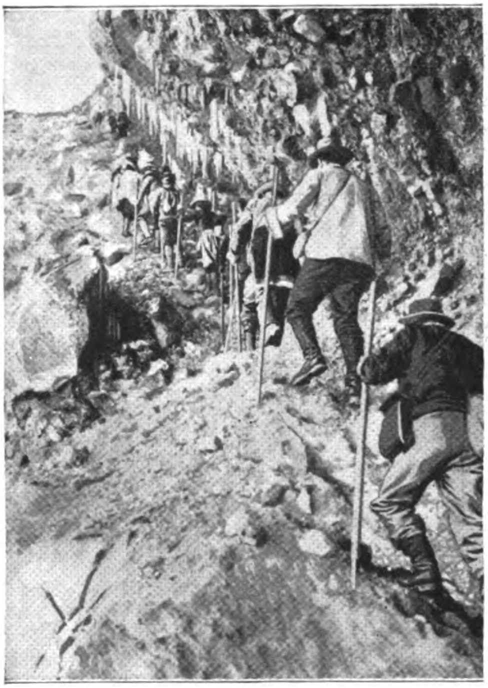
BY FRED TELFORD



A Bit of Easy Going on the Nisqually Glacier, Rainier National Park, Washington: This Section of the Trail Is So Good That the Party has Dispensed with Ropes—Safeguards Which are Never Omitted Where There Is Any Danger

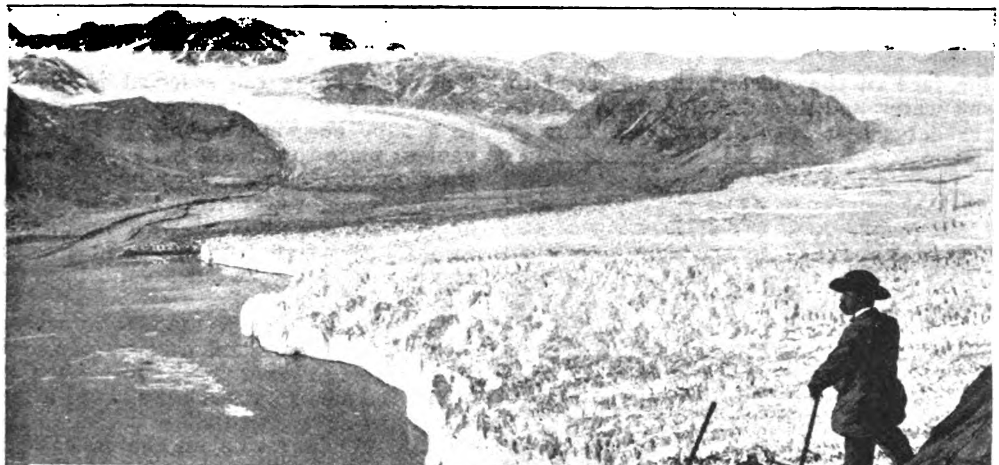
THANKS to the "see-America-first" movement and the difficulties of European travel due to the war, many Americans are finding out that they can have all the thrills of seeing and climbing glaciers without paying the Swiss innkeepers and guides a stiff toll. Right here in the United States easily accessible but little-known glaciers show the awe-inspiring crevasses and wonderful changing colors that one who has ever had first-hand experience with these slow-moving rivers of ice can never forget.

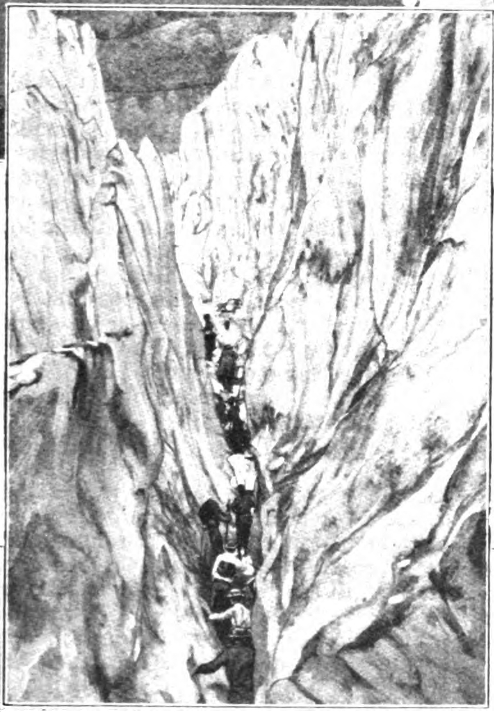
Among the national parks easily accessible by railroad, that furnish the sport of glacier climbing, are Glacier Park and Ranier National Park. Some of the thrills obtainable in the latter are shown in the photographs. At a distance, glaciers have a deceptive trick of looking smooth and offering easy footing. Near at hand, however, the immense crevasses with their depths and the extremely rough surface, due to uneven melting and inequalities in the bed, put a different face on affairs. Where the surface is much broken and, in addition, slopes strongly, even the novice realizes the need of ropes, creepers, and alpenstock.



On the Path—if Such It can be Called—Leading to Nisqually Glacier: This Rock-Strewn Route Gives Many Climbers Quite as Much Pleasure as the Glacier Itself

It is Alaska, however, that offers the de-luxe glacier sight-seeing. This little-known land not only has the largest glaciers—big enough to make Switzerland's pride look insignificant—but also the most easily accessible. In fact, during the summer season the excursion steamers run right up to

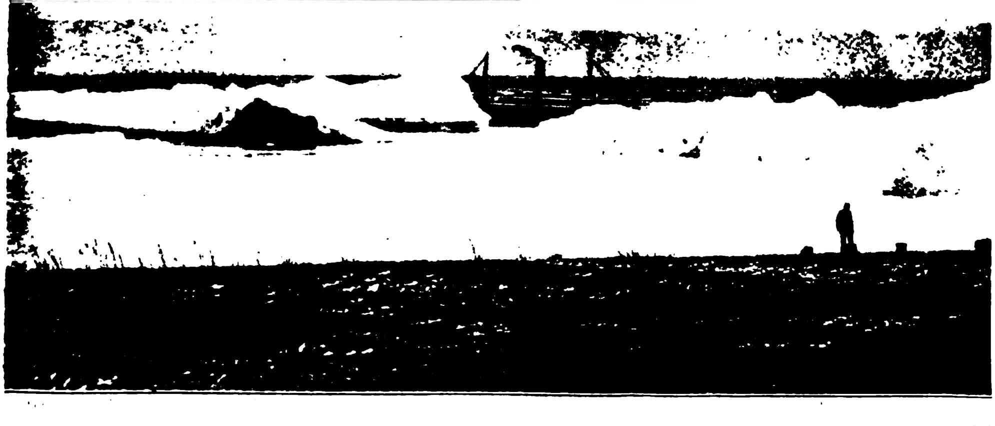




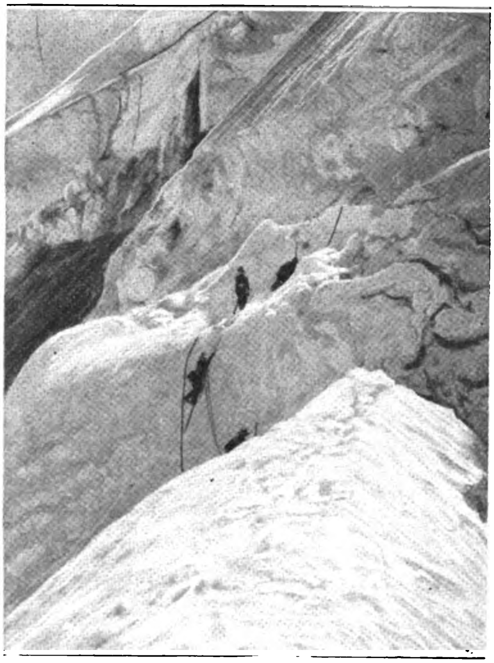
Above: An Arm of Muir Glacier, Alaska, from an Elevation of 1,800 Feet; a Panoramic View That Is Worth All the Climb. At This Height It Is Difficult Properly to Estimate the Size of Objects in the Distance. The Ice Wall Fronting the Sea Is Several Hundred Feet High, and the White Specks in the Water Are Icebergs Weighing Hundreds of Tons

Left: Single File up a Deep Crevasse in Nisqually Glacier, Rainier National Park. The Beauty of This Steep-Walled Icy Cañon is Much Enhanced by the Wonderful Colors Produced by the Refraction of Light in the Ice. The Path Is Not So Difficult to Ascend as It Appears

Below: A Summer Excursion Steamer among Icebergs in Glacier Bay, Alaska. Vessels Carrying Sight-Seers Often Run within a Quarter of a Mile of the Foot of a Glacier, Giving an Excellent View of the Slow-Moving Mass



the face of the glaciers that descend to salt water, and thread their way in among the bergs that have broken off. One of the sights along the seacoast is that of the iceman hitching his gasoline launch to a baby berg and towing it to a convenient place to cut out his supply. Perhaps nothing else does so much to impress the sight-seer with the futility of man's efforts compared with nature, as to note the tiny hole made in even a small berg by taking out several hundred tons of ice.



The Glacier Climber can Find Rough or Smooth Going, as He may Wish, in Alaska. Here are Shown Some of the More Adventurous Sportsmen Making Their Way across Perilous Crevasses

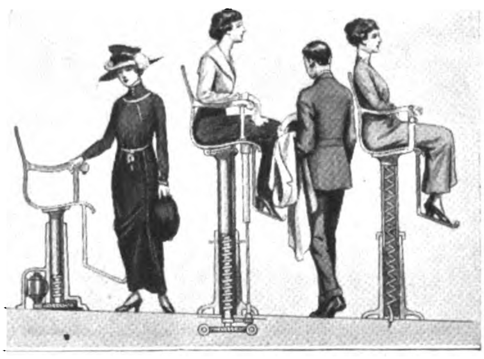
For the man—or woman—who wishes to do more than sit at ease on the deck and view the glacier front and broken-off bergs, the steamers make a stop of a few hours at one point to allow a visit to the glacier. A short ride on the railroad, a walk of three miles over an easy trail, and the sight-seer is at the foot of the glacier.

This particular trail is also easy to climb, as the surface is little broken. The ease with which the trip is made is shown by the fact that one summer recently an elderly couple, past 60 and not especially robust, actually spent two hours climbing over the top of the lower portions—and arrived back in time for lunch before the boat sailed. At no other place in the world is this possible.

Attempting to describe glacier climbing is like painting the lily. The photographs give some idea of the sport, but, of course, fail completely in portraying the varied and beautiful coloring.

THEATER CHAIRS THAT RAISE AND LOWER THE OCCUPANTS

Chairs so mounted that they can be raised and lowered 2 ft. or more by the occupants have recently been patented for use in motion-picture and other theaters. The advantage of these seats is that they lift the users high enough to give them a view of the stage unobstructed by persons passing to and fro immediately in front of them—a frequent occurrence at the "movies." Each chair is supported by a telescoping tubular column and a preferable means of operating it is a motor-driven worm, within the column, controlled by a push button attached to the chair. Foot rests suspended from each seat enable the occupant to sit as comfortably when the chair is raised as when it is lowered. Alternative means for operating the chairs are worms driven from a central power plant, and hydraulic apparatus.



Theater Seats with Telescoping Supports Which can be Extended to Raise the Occupants So That They may Have an Unobstructed View of the Stage

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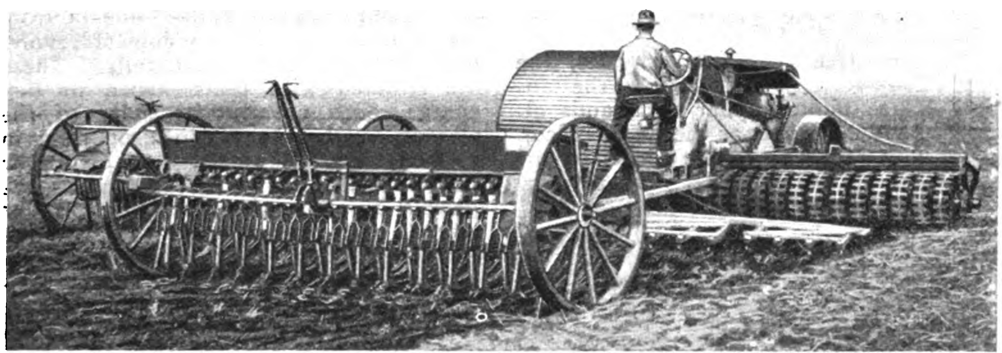
ℭPutting the subterranean runways of a mole to use as irrigation tunnels is the unusual method employed by a woman of Bryon County, Okla., to get even with the pests that were undermining and destroying her garden. By repeatedly filling the mole burrows with water, she effectually turned damage into profit and banished the moles.



The Tractor's Novelty is Here Shown to Be Purely Incidental, Capacity for Work Being the Chief Attribute Claimed for It. The Picture Above Explains How Implements are Handled at the Sides by Attachment to the Frame

BROAD DRIVING DRUM IS ONE FEATURE OF FARM TRACTOR

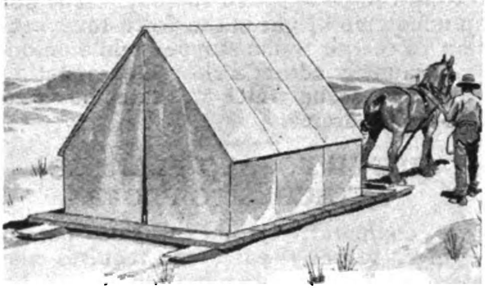
There are other reasons than mere novelty of design that are causing interest to be manifested in a drum tractor that has been developed for heavy-duty farm work. By its very nature it is distinctive in appearance, but of greater importance are some of its mechanical features. Among these are its driving system and frame, the latter being essentially of one-piece construction and suspended beneath, instead of being supported above, the rear axle.

No differential is employed. Power is transmitted through a simple gear set to a jackshaft. Two heavy chains, working in oil, engage sprockets secured to the drum itself, and pull uniformly at each side. The frame is the drawbar, and since power is delivered in a straight line, the load may be attached at whatever point best suits conditions. Furthermore, the simplicity of the frame construction permits arms to be extended from the sides and harrows to be hitched to them.

The tractor is equipped with a four-cylinder engine and works at a speed of from two to two and a half miles an hour. The drum is 54 in. wide and of equal diameter. The front wheels are 8 in. in width and set outside of the drum's path, so that, in advancing, the machine rolls a 70-in. strip of ground. There is direct transmission of power to the pulley, which drives a belt at a speed of 2,600 ft. a minute. The turning radius of the tractor is 10 ft. and its weight approximately 5,200 pounds. The entire machine is protected by a corrugated sheet-metal cover that follows the contour of the drum at the rear.

TENTS MOUNTED ON SKIDS SPEED HIGHWAY WORK

Four tents, mounted upon skids for the sake of extreme portability, were used to facilitate construction work on the section of the Lincoln Highway crossing the Great Salt Lake desert in Utah. The construction crews made rapid progress over this difficult ground, and the skidded tents were moving forward a good part of the time. Two 400-ft. stretches of desert right of way were so bad that a corduroy foundation had to be laid before the grade could be constructed.



Tents, Most Portable of All Shelters, were Made Still More Mobile by Mounting Them on Skids, to Speed Construction Work on a Bad Stretch of Lincoln Highway

ELECTRIC-RADIATOR HEAT MADE SELF-ADJUSTING

An electric current through a thermometer column, with an upper contact that closes a relay, automatically opens the main heating circuit when the temperature rises above a desired point. A French inventor provides this means for making the common electric radiator thermostatic, or self-regulating.

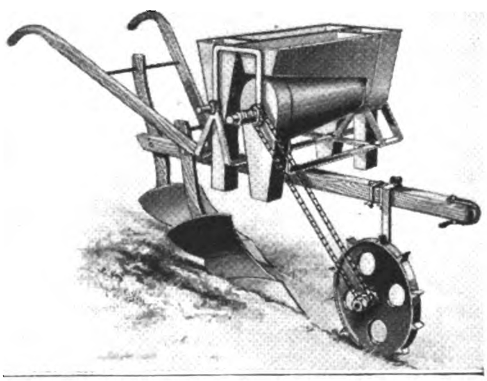
MOVIES HAVE RIGHT OF WAY IN LOS ANGELES

On the streets of Los Angeles, the premier movie city of the world, the motion-picture photographer commands almost as much respect as the traffic officer, or at any rate the public yields to his wishes as readily, if the needs of a suitable setting can be supplied thereby. It is not an uncommon sight in the down-town section to see all traffic stopped while actors walk jauntily across a cleared area, acting parts in a scene which will later be fitted into a film drama.

A Movie Drama in the Making on a Business Street: A Scene in Los Angeles Showing Traffic Interrupted While a Camera Man, at the Left, Takes Pictures of the Two Actors at the Right

SIMPLE POTATO PLANTER ATTACHES TO PLOW

A comparatively inexpensive potato planter, recently patented, requires the attention of but one man and can be mounted on any suitable plow. It will plant two rows at once, the seed being contained in two troughlike hoppers, from which it flows into two conical revolving drums, placed horizontally. These are situated with their larger, or discharge, ends at opposite sides of the planter so that they can drop seed in parallel rows. The drums are driven by a chain connected with the implement's gearing from a wheel running on the ground. Scoops attached to the large end of each drum inside, pick up the desired amount of seed and elevate it to discharge holes, through which it drops into the furrows. At the small end of each drum is a small hopper equipped with a simple discharge device operated by the drum axle. These hoppers can be used to place fertilizer in the furrow along with the seed.



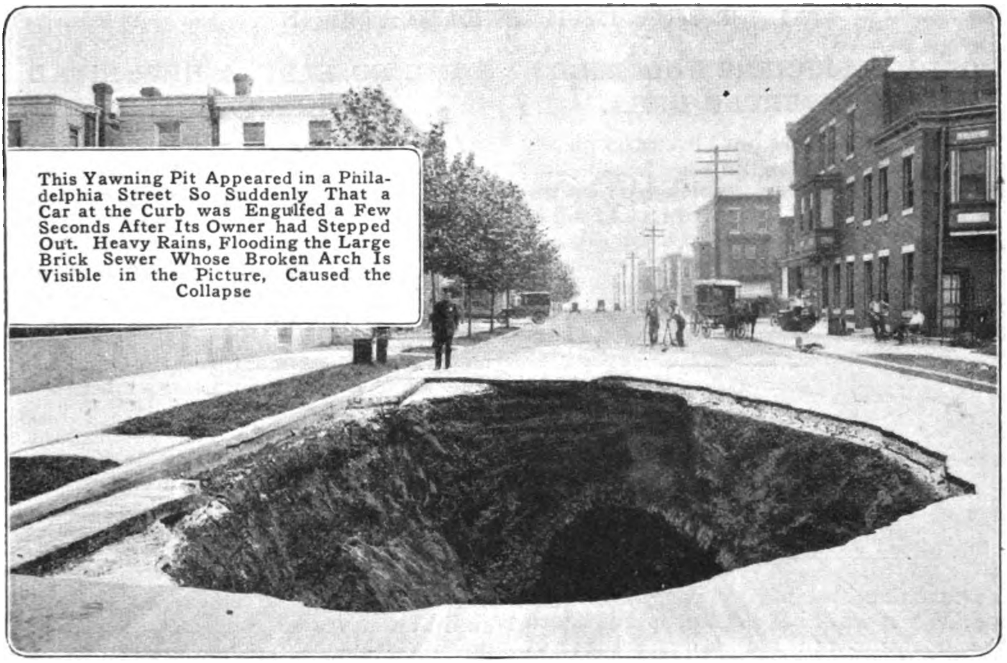
Potato Planter of Simple Design Which Plants Two Rows at Once: The Seed Passes from the Troughlike Hoppers into the Conical Revolving Drums, from Which It is Dropped into the Furrows at Regular Intervals

DISABLED TOMMIES LEARNING DIAMOND CUTTING

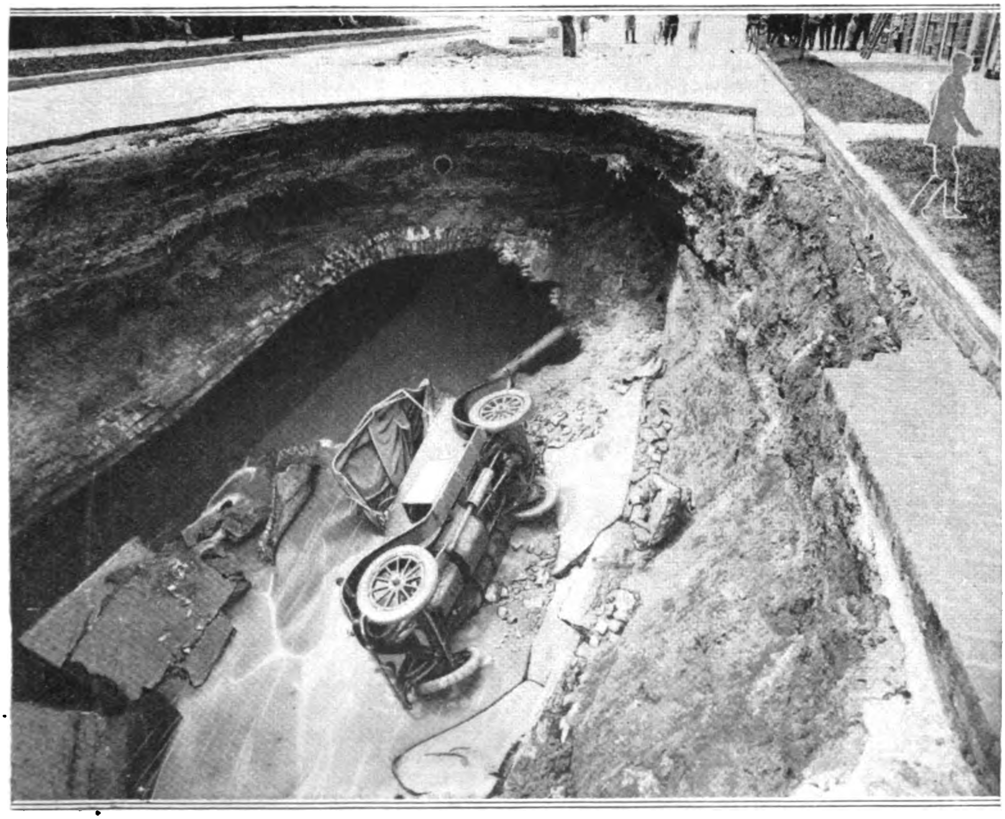
A British diamond corporation has established a diamond-cutting factory at Brighton, England, and has arranged for instruction centers in various parts of the country where disabled soldiers can learn how to transform rough diamonds into finished gems. Before the war practically all of the British diamond output, which means practically all of the world's output, was shipped to the continent of Europe to be polished. Proprietors of the new factory already employ several hundred ex-fighters and claim to have proved that they can do as good work as the men on the continent who devoted their lives to the diamond-cutting trade.

STREET PAVEMENT YAWNS AND SWALLOWS CAR

During a recent heavy rain a considerable area of a well-paved Philadelphia street suddenly caved in, swallowing a heavy touring car which had just stopped at the curb. The owner of the car stepped from it only a few seconds before it dropped into a hole 30 ft. deep. The collapse of a 14-ft. brick sewer, flooded beyond its capacity, was the cause of failure of the pavement. A second heavy storm immediately following brought another rush of water through the broken drain. Although a guard was promptly thrown about the opening, the car, which was lying on its side in the crushed sewer, entirely disappeared without leaving a trace either in the sewer or in the creek which receives its outflow.

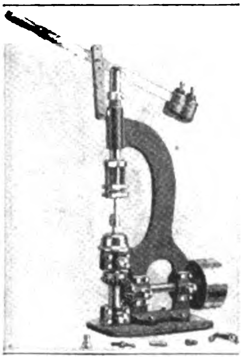


This Yawning Pit Appeared in a Philadelphia Street So Suddenly That a Car at the Curb was Engulfed a Few Seconds After Its Owner had Stepped Out. Heavy Rains, Flooding the Large Brick Sewer Whose Broken Arch Is Visible in the Picture, Caused the Collapse



This Picture was Taken a Short Time After the Street Caved In, and the Automobile Which Fell into the Hole, 30 Feet Deep, is Seen to be Lying in the Débris of the Broken Sewer. After Another Flood had Swept Down the Sewer a Little Later, the Car Entirely Disappeared, and a Thorough Search of the Sewer and Its Outlet Failed to Discover Any Trace of It

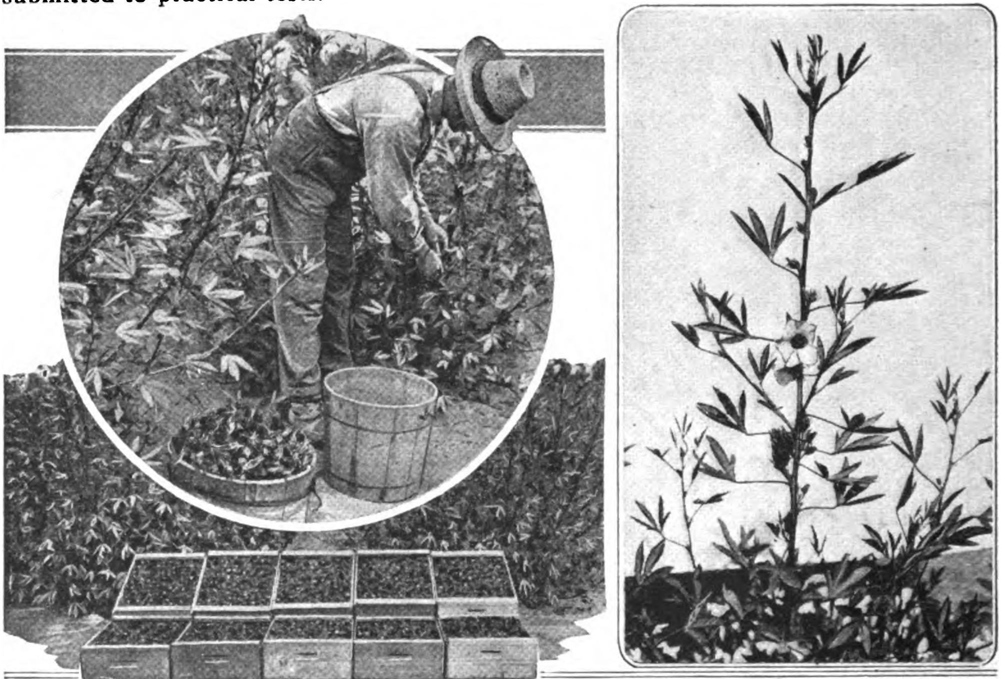
GREAT EFFICIENCY CLAIMED FOR INVERTED DRILL



Conventional ideas have been completely disregarded in designing a power drill which bores upward instead of downward, and which the makers claim effects a 50-per-cent increase in the speed of operation, owing to the fact that the borings fall out as fast as they are cut. The work is forced down onto the drill automatically by a lever placed almost horizontally above the machine and having weights at one end. When work has been properly placed one operator can look after several of these drills at once. When the drill breaks through, a spring cushion at the top of the spindle checks the force of the blow and so prevents breakage. This drill press is built particularly for work on articles of steel, brass, or cast-iron and has been submitted to practical tests.

THE ROSELLE, A NEW RIVAL OF THE CRANBERRY

An industry as yet little known in this country, but one which seems destined to attain considerable magnitude, particularly in southern California and Florida, is the growing of the roselle, a tropical plant from parts of which are made jams and jellies closely resembling those made from cranberries. The roselle is a native of the old world, is an annual, and attains an average height of six to eight feet. The plant is ornamental and bears large yellow flowers, each with a dark red eye. The calyxes of the flowers, which mature about three weeks after the latter open, are the parts gathered for marketing, being cut from the bushes with a sharp knife. In California the harvest time extends from late August until the coming of frost, while in Florida it is somewhat later in starting. If the calyxes are gathered at the proper time, new flowers appear in rapid succession, so that the average yield from a plant is five to six pounds. In recent years the roselle has been extensively cultivated in Australia, particularly Queensland, and it has long been grown in India for its fiber which is used a great deal in making cordage



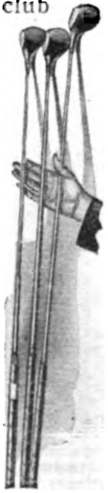
PHOTOS BY ROBERT W. HODGSON

Boxes of Roselle Calyxes, Which are Made into Jellies and Jams Like Cranberries, are Shown at the Left. In the Circle, a Picker is Gathering This "Fruit." A Typical Plant is Shown at the Right with a Blossom About Midway up the Stalk and coarse textiles. Grovers are advised to cultivate about 680 plants to the acre. As yet the market for this product is limited, but the retail prices range from 10 to 15 cents per pound. The plants are quite hardy and not subject to many pests.

CHINA'S ANCIENT GRAND CANAL TO BE MODERNIZED

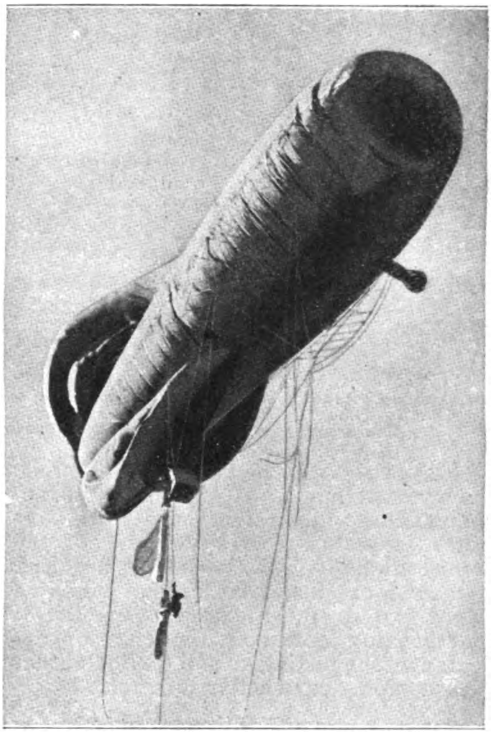
Preliminary work is about to begin on the modernizing of China's Grand Canal, an ancient waterway 1,000 miles long, extending from Hangchow, on the south, to Tientsin, on the north. One portion of the canal is 2,400 years old, and another section more than 1,000 years old. Some of the most primitive locks in the world are still in use along this route. The Chinese government has appropriated $6,000,000 with which it is proposed to modernize about 100 miles of the canal and reclaim some thousands of acres of fertile land, now useless because swampy or under water. An American engineer will have general charge of the work, while operating under him and associated engineers will be a number of young Chinese, many of whom have obtained their technical training in the United States. If the task now about to be undertaken results in all that is promised, it is believed that the Chinese government will not hesitate to make additional appropriations for more extensive improvements.

GOLF CLUBS WITH SHAFTS OF STEEL



Of special interest to golf players is a club made with a steel instead of a hickory shaft, which, it is claimed, possesses all the flexibility of the wooden shaft and has additional desirable features. The steel shaft is hollow, tapers toward the lower end, and is much smaller in diameter than one of hickory. This is said to give the player additional driving power. because of reduced friction when the club is swung through the air. The head is so mounted as to avoid any unpleasant jarring of the hands when the ball is struck. All types of clubs are to be made in this manner, and at a cost somewhat lower than those with hickory shafts.

ACCIDENT ENDS BALLOONIST'S PARACHUTE JUMP ABRUPTLY



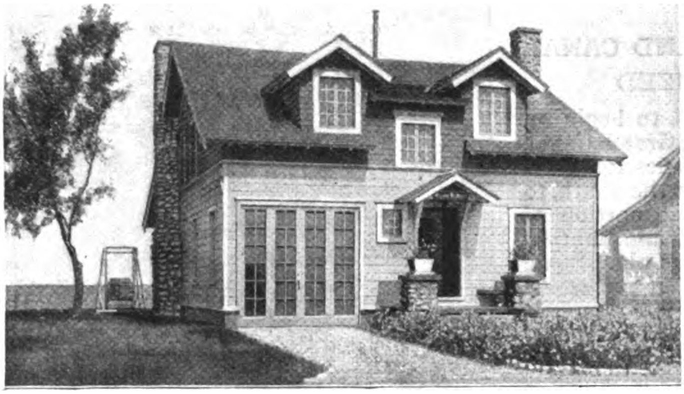
Dangling Helplessly in the Cordage of a Second Parachute, the Soldier was Hauled Down, None the Worse for His Experience

Quite a thrilling mishap was experienced recently by an army balloon observer at one of the western training camps, when he attempted to make a parachute leap from an elevation of 3,000 ft. As he dropped over the side of the basket, he became entangled in the cordage of another parachute that was folded in a case fast to the craft. A second later, instead of shooting earthward through the air, he was dangling, head down, a helpless captive in mid-air. The fact that the jump was attempted from a captive balloon undoubtedly saved the soldier's life, for he was quickly hauled down, uninjured.

ℭHereafter all post offices will act as information centers for directing discharged men to the nearest soldiers' and sailors' bureau. These bureaus are being established throughout the country by the United States Employment Service, in coöperation with various local and national organizations.

COMBINE HOUSE AND GARAGE WITH PLEASING EFFECT

Many attempts to incorporate a garage in a modern house have left much to be desired in the way of architectural effect. Such a dwelling as is shown in the accompanying illustration, therefore, attracts favorable interest because of the architect's happy solution of his problem. Artistic doors, made like French windows, afford ingress to the garage at the left of the dwelling entrance, the exterior appearance suggesting a sun parlor rather than a motor-car shelter.



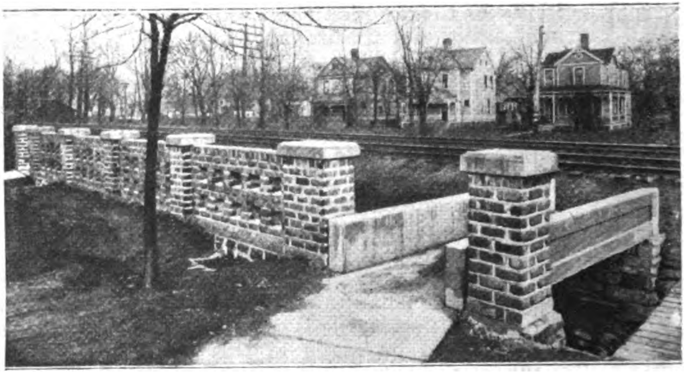
A Lakeside Cottage in Which a Garage has been Incorporated in a Way That Is Unusually Pleasing: The Long Glass Doors Suggest a Conservatory or Sun Parlor, Rather Than a Garage

ELECTRIC AND STEAM POWER FOR BLAST-FURNACE BLOWER

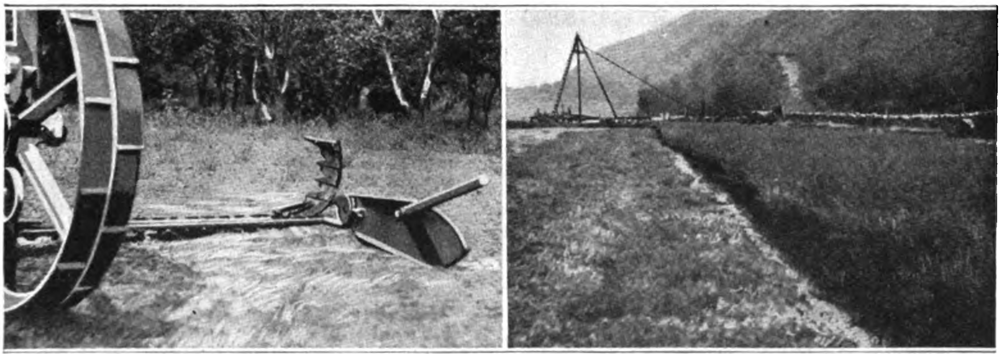
In constructing a special blast-furnace blower recently, provision was made against interruption of operation in the event of failure of the electric current for any reason. Normally, motive power is supplied by a synchronous motor, while in an emergency a steam turbine is employed. The interesting point is that the change from the one to the other is made automatically. Air pressure keeps a balanced valve in the steam-supply pipe closed, and the turbine idle. The instant, however, that the electric current fails, the air pressure from the blower drops and the steam valve opens, starting the turbine. As soon as the blower and turbine shafts attain the same speed, the clutch between them engages and that between the motor and blower disengages. This change from electric to steam power takes place quickly and so smoothly that it is said to be nearly impossible to detect the moment of engagement.

WALL BUILT OF SAMPLE BRICK COSTS LITTLE

Evidence of thrift and public spirit on the part of municipal employes is found in an artistic brick wall, erected at the end of a blind street in Cincinnati, which spot was the scene of several accidents before this barrier was erected to mark the end of the thoroughfare. The wall was built by the city engineering department at a cost of only $219. Had all the materials and labor been paid for at regular rates, it would have cost about $1,200. The saving was made possible by using samples of brick and cement which had been submitted to the department for tests, including the use of a "rattler" for the bricks. The fact that the rattler nicked off the corners of the brick did not detract from their usefulness. The wall was built largely by department employes when other work was slack. It served as a barrier between the end of the street and a ditch skirting a railroad right of way. At either end were footbridges crossing this ditch.



Ornamental Brick Wall Marking the End of a Blind Street in Cincinnati: It was Built at Small Cost by the City's Engineering Department with Samples of Brick and Cement Submitted for Test Purposes

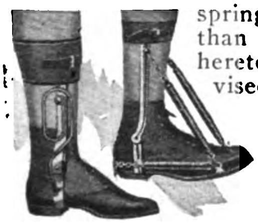


Left: A Mower with a Curved Extension Attached to Its Cutting Bar for Use in Alfalfa and Other Crops That Become Badly Tangled. The Manner in Which This Device Completely Separates the Cut from the Uncut Material at the Edge of a Swath is Shown at the Right

ATTACHMENT FOR MOWER CUTS EDGE OF SWATH CLEAN

In using an ordinary mower to cut alfalfa, clover, and similar crops, difficulty is experienced because at the edge of each swath part of the cut material remains tangled with that which is uncut, rendering it necessary to make allowance for this strip. One of the simplest devices designed to remedy this condition consists of an extension of the cutting member attached to the outer end of the latter. This attachment curves upward so that it completely separates the newly cut swath from the uncut material. The blade is of thin steel and moves back and forth in its sheath without difficulty. The extension tends to throw the cut material at the edge of the swath toward the machine, leaving a path of clean stubble adjoining the standing crop, along which one of the horses can walk.

CONCEALED SPRING DOES WORK OF FOOT MUSCLES



For the benefit of the patient who has lost control of the forward portion of either foot, a special spring, less conspicuous than apparatus used heretofore, has been devised to hold the member up, automatically. It consists of a piece of steel shaped like an interrogation point attached to levers which are in turn fastened to the shoe and to a band about the calf. The apparatus is practically all concealed beneath the trouser leg.

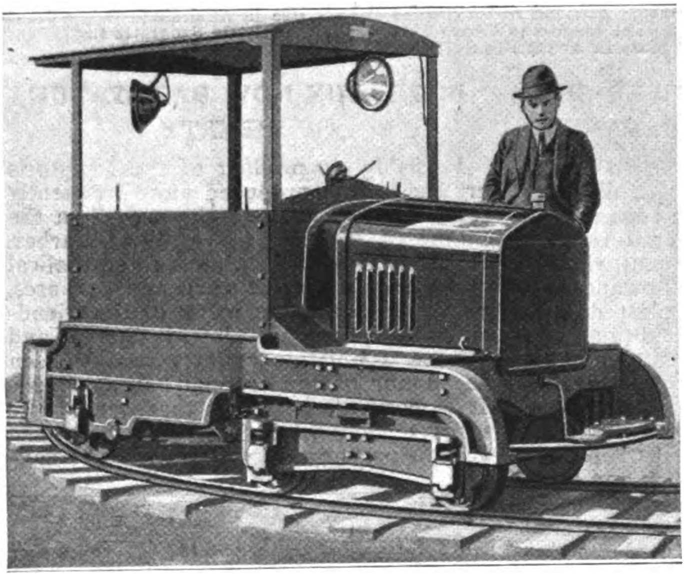
BORDEAUX NOW HAS STATUE OF LIBERTY

Probably no product of the sculptor's art has been reproduced more frequently since America entered the war, than the Statue of Liberty in New York Harbor. Certainly no other statue is so symbolical of America's present spirit and purposes, nor is there a better token of the friendship between the United States and France, the latter country having been the donor of the original bronze figure. It is particularly fitting that one of the many replicas which have been set up in various parts of the world should be conspicuously located in Bordeaux. To the thousands of American soldiers passing through that city it is a happy reminder of the homeland.

Small Reproduction of the Statue of Liberty, Unveiled Recently in Bordeaux, France: To the Thousands of American Soldiers Now Frequenting That Port It Is a Happy Reminder of the Homeland

LIGHT MOTOR-CAR PARTS USED IN BUILDING LOCOMOTIVE

Of the numerous types of self-propelled vehicles that owe their existence to a certain ever-present model of light motor car, perhaps none is more interesting than an industrial locomotive of current development. The latter is a hard-working little machine of 30-in. gauge and 4,000-lb. weight, that exerts a drawbar pull of 500 or 600 lb. and is especially adapted for moving a train of a dozen or more one-ton ore cars at a mine, or pulling material or dump cars at a construction site. The front end, where the familiar radiator and hood are mounted, is practically the only outside part suggestive of the automobile. Beneath the hood is the small motor, which gives the locomotive a speed of 10 miles an hour. Its power is transmitted to a countershaft connected by chains to the drivers. The latter, two in number instead of the usual four, are of 12-in. diameter and bear 2,400 lb. of the weight. In addition to the regular transmission, there is a special reversing mechanism that gives the locomotive the same speeds rearward as it has forward.



This 4,000-Pound Industrial Locomotive, Designed Especially for Moving Trains of Ore Cars at a Northern Mine, Constitutes an Interesting Illustration of a Well-Known Light Motor Car Adapted for Rail Work. Its Gauge Is 30 Inches and Its Operating Speed 10 Miles an Hour

A pony truck at the front is held in place by a king-pin, and a seven-foot radius curve can be negotiated with ease. Over all, the locomotive, which is not intended for underground operation, measures about 10 ft. The top of its cab is six feet above the rails. The driver is provided with a seat of the farm-implement type, before which is the motor-car steering column with spark and gas levers, but minus the unnecessary wheel. Other models of the locomotive are built with gauges of 18 and 36 inches.

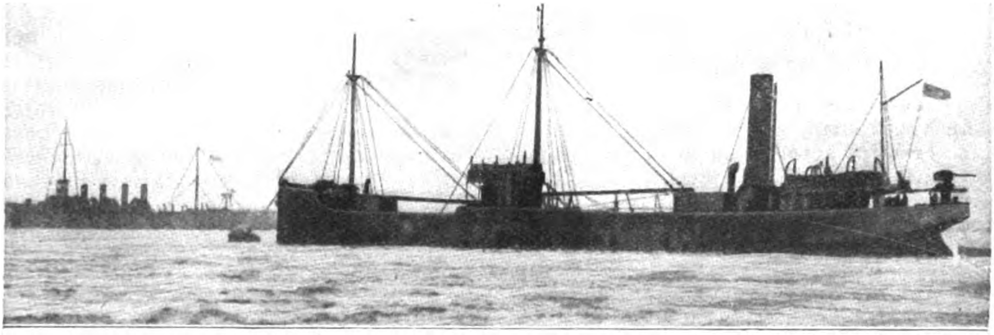
SUBMARINE NEST REVEALED BY AMATEUR SNAPSHOT

Certain dark and mysterious spots in a photograph left for development in a shop in a small English coast town led to a reprimand and a $250 reward for the lady whose amateur camera made the exposure. The astute shopkeeper, when he observed the strange spots coming up in the developer, forwarded the plate to the British Admiralty. The shadowy images turned out to be German U-boats lying in the creek, whose beauty had induced the amateur to break the English war rule against photographing.

The whole nest of enemy submarines was promptly captured, betrayed by one of those occasional optical freaks which record on a plate objects invisible to the eye. The British Admiralty had known of the U-boat nest, but all efforts to locate it had been unsuccessful, though the photographic method had been tried several times.

LIGHTNING LOSES TERRORS IN ITALIAN BALLOON

So constructed that no metal surfaces or parts whatever are exposed, a new type of observation balloon used by the Italian army is enabled to stay up during electrical storms without special danger to its occupants. The observer's basket communicates with the crew on the ground by wireless telephone. Unusual stability and lifting power are other characteristics of the new type, one of which rose to the record height, for an observation balloon, of 16,000 ft. above London.



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H. M. S. "Suffolk Coast," One of the Royal Navy's Tramplike Q-Boats That Plied the Trade Routes and Decoyed Hun Submarines to Encounters of a Type for Which They Had Little Taste

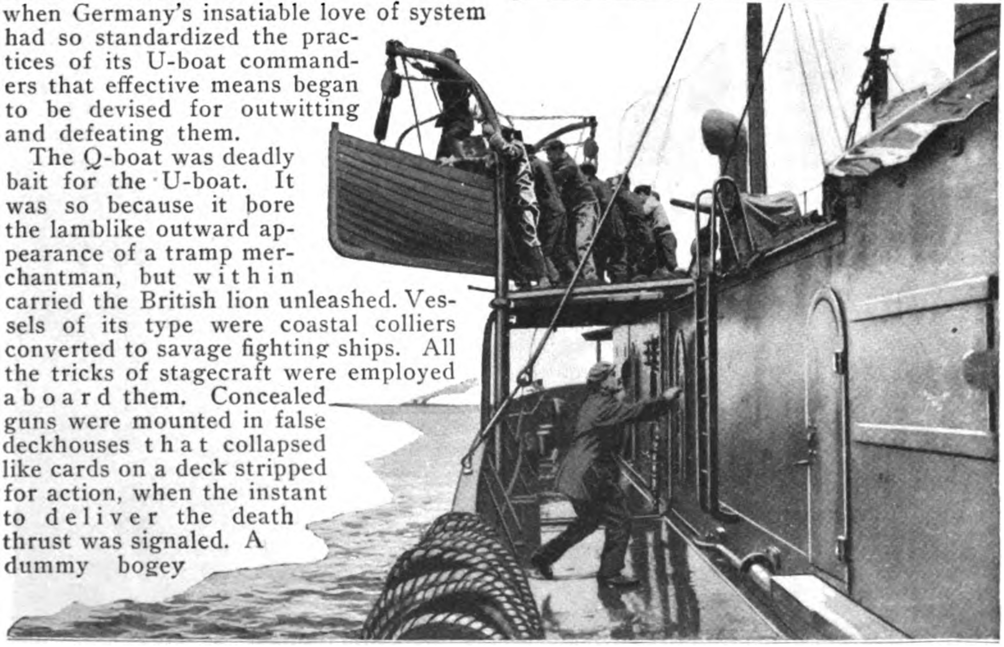
DARING Q-BOATS UPHELD ROYAL NAVY'S TRADITION

MANY chapters of romance were added to the lore of the British Navy during the grave days of the world war, and prominent among them is one that concerns the adventurous exploits of the heretofore unmentioned Q-boats, as strange craft as ever fought an unscrupulous foe.

Britain's Q-boats haunted the trade routes and preyed upon the "hell-divers" of the Hun. They were conceived, fashioned, and sent to sea when the weekly reports of sinkings were as serious as the faces one saw in Whitehall. That was when Germany's insatiable love of system had so standardized the practices of its U-boat commanders that effective means began to be devised for outwitting and defeating them.

The Q-boat was deadly bait for the U-boat. It was so because it bore the lamblike outward appearance of a tramp merchantman, but within carried the British lion unleashed. Vessels of its type were coastal colliers converted to savage fighting ships. All the tricks of stagecraft were employed aboard them. Concealed guns were mounted in false deckhouses that collapsed like cards on a deck stripped for action, when the instant to deliver the death thrust was signaled. A dummy bogey funnel in the forecastle head covered a periscope for the captain's use when below. A hidden hatchway communicated with the bridge.

From stem to stern a Q-boat was a masterpiece in camouflage. Its crew, uniformed in the indiscriminate attire of rowdy "hands," was the slovenly crew of a rat-laden tramp—to the Hun. In stricter conformity to fact, however, the men were "hand-picked" from the personnel of the Royal Navy; as fearless and alert a crew as ever breathed salt air. Their assign-



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The "Panic Crew" Played an Important Part in the Q-Boat's Drama of Camouflage. While Hidden Gunners Prepared for Action, These Men Fought for Places in the Small Boats, Some Even Diving Overboard

ment was the daring one of decoying "steel sharks" and "harpooning" them, which often meant first being a target for torpedoes. More than unfearing Jacks were these men, for fully half of their number were actors also, who performed the most singular of dramas. These particular seamen composed what was known as the "panic crew." Their part in decoying the dangerous prey was to enact a scenario that was rehearsed many times before being staged for a German audience.

One of the many interesting experiences of the Q-boats serves well to narrate the story of how they fought. Picture a ship that carried aboard a swarthy, big-jointed sailor togged in skirts and lolling in a deck chair on the poop. Fancy a green parrot tied in a cage that hung where its guardian might reach it conveniently when responding to his cue. Think of a ship sailing the merchant lanes for months, offering itself as a target to hidden foes in order that it might fight, even though crippled first. And then imagine the foaming wake of a torpedo suddenly extended across its path shortly after dawn on a fine spring morning.

Outwardly the tramp held to its course and observed nothing. On board the man-of-war, however, a long-awaited alarm rang clearly and men crawled to battle positions. Presently a submarine broke the surface several hundred yards away and fired across the tramp's bow. That was the signal for the curtain to be run up on the strangest of war dramas. The engines were stopped, steam poured from the exhausts, and the ship rocked in the trough of the waves. The panic crew became "hysteric." On the bridge the captain executed the gestures of a slap-stick comedian and roared order after order. In a riot of apparent confusion, the panic crew raced to the small boats. The U-boat, meanwhile, approached at top speed and fired another shell that missed the ship's vitals by a few yards.

The single blast of a whistle blown by the captain was the signal to cease acting and begin fighting the decoyed submarine, which had now come sufficiently close to be a good target. In immediate response the white ensign of the Royal Navy was run up. A lever was jerked and the false deckhouses collapsed, exposing heavy rifles and machine guns in charge of eager and expert crews. In less than three minutes from the time the commander issued the order to lie to and fight, a hit was registered that foundered the U-boat.

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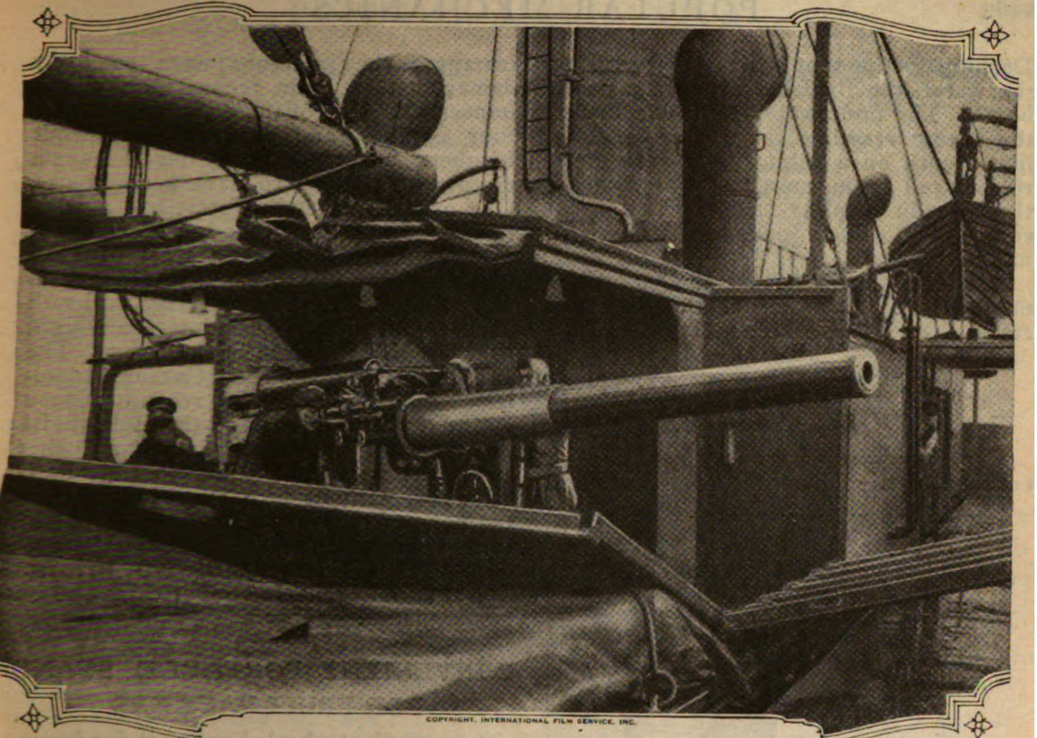
Not a Natty-Looking Crew from the Standpoint of Uniforms, but a Nervy Lot of Seamen, "Hand-Picked" from the Royal Navy's Personnel for Q-Boat Service, Here Shown aboard the "Suffolk Coast," One of Several Ships They Manned in Their Adventurous Campaign against U-Boats



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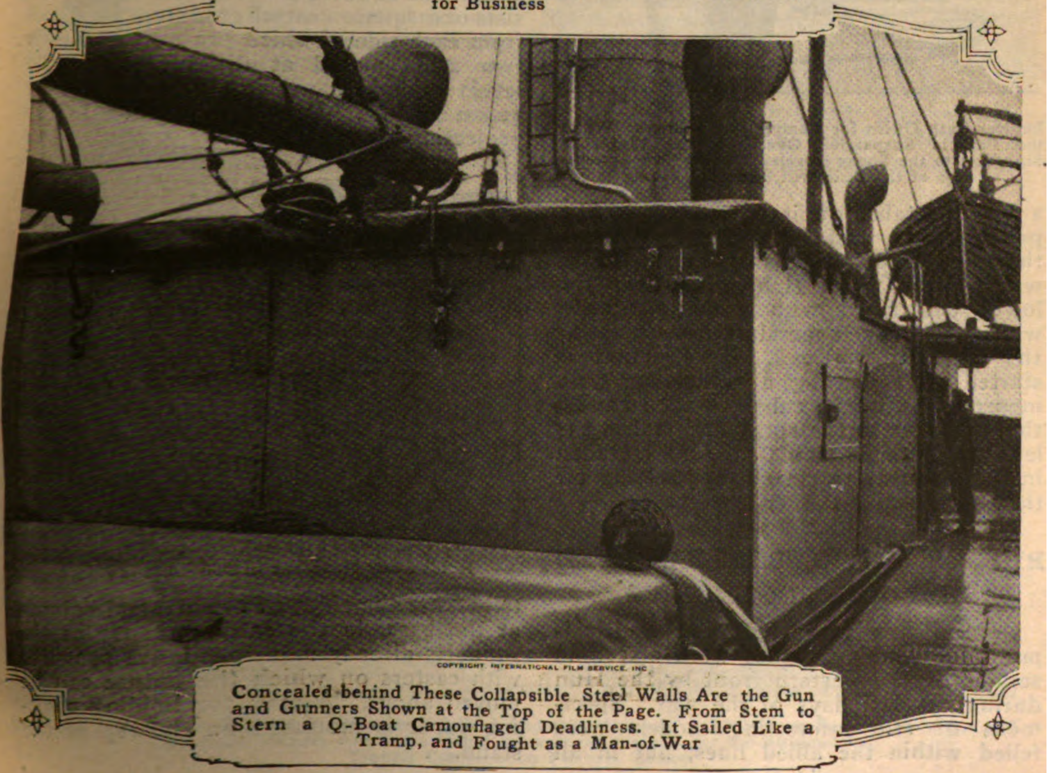
As the White Ensign was Hauled Up, the Sides of the False Deckhouse Collapsed Like Pasteboard Cards, Disclosing a Big Hun-Hating Gun Trained on Its Target and the Crew Ready for Business



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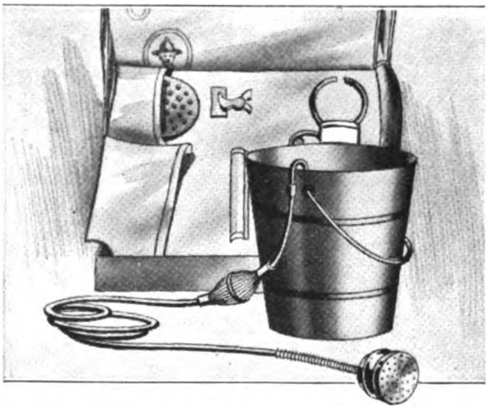
Concealed behind These Collapsible Steel Walls Are the Gun and Gunners Shown at the Top of the Page. From Stem to Stern a Q-Boat Camouflaged Deadliness. It Sailed Like a Tramp, and Fought as a Man-of-War

Dashing to the spot where oil spread on the water, the Britisher dropped a depth bomb. The underwater explosion hurled the enemy vessel to the surface, end up, like a cork on a fishing line. The stern rifle blazed again, mercilessly perforating the already helpless "sub," which presently sank to Davy Jones's locker with all hands.

A shout went up from the victorious man-of-war. A moment later the ship steamed ahead in search of further prey.

COMPACT SHOWER BATH FOR CAMP USE


Shower-Bath Outfit for Campers or Soldiers: When the Pail is Suspended Overhead, the Water is Siphoned to the Spray Nozzle. One or Two Squeezings of the Bulb will Start the Flow

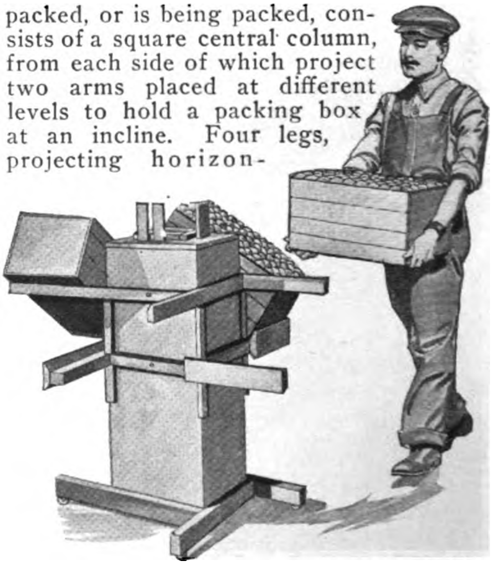
The luxury of a shower bath can be enjoyed by a soldier or camper by using a new portable outfit connected with a pail of water, suspended 6 or 7 ft. above the ground. It consists of a rubber tube which serves as a siphon, and has the lower end fitted with a spray nozzle, while a U-shaped metal section fits over the edge of the pail. The siphon is started by squeezing a collapsible bulb incorporated in the tube. A wire handle that attaches to the spray end makes the latter easy to manipulate. Also included in the outfit are a clamp for shutting off the water, and a rubber sponge.

BIG GERMAN BOMBERS MOUNTED FIVE AND SIX ENGINES

Several new types of giant multiple-motored bombing planes were placed in service on the western front by the Hun during the last days of the war. Specimens of two interesting models were felled within the allied lines, but in all instances the machines were so badly damaged that their reconstruction was impossible. One of these planes mounted four engines, and another, five, while bombers propelled by as many as six motors are known to have been in use. One of the four-engine craft had a wing spread of approximately 140 ft. Its six-cylinder motors, giving a total of 1,200 hp., were mounted in pairs, placed end to end on each side of the fuselage and well forward, so as to concentrate the weight near the main plane's leading edge. The two front motors turned tractor propellers, while those in the rear, equipped with flywheels and driving through shafts and reduction gears, each worked a pusher screw. A five-motor plane was similarly arranged, with its fifth engine placed in the nose of the body and connected to a tractor propeller. Its combined horsepower amounted to 1,500. No information is as yet available concerning the six-motor planes.

CONVENIENT PORTABLE STAND FOR FRUIT PACKERS

A convenient wheeled support for boxes in which fruit or other material has been packed, or is being packed, consists of a square central column, from each side of which project two arms placed at different levels to hold a packing box at an incline. Four legs, projecting horizontally from the sides of the central column at the base, in the same manner as the supports already mentioned, are provided with casters on which the fixture can be moved about. A tray for holding packing paper is mounted on the top of the stand.


Packer's Wheel-Mounted Truck, or Stand, Which Holds Four Boxes at a Convenient Angle

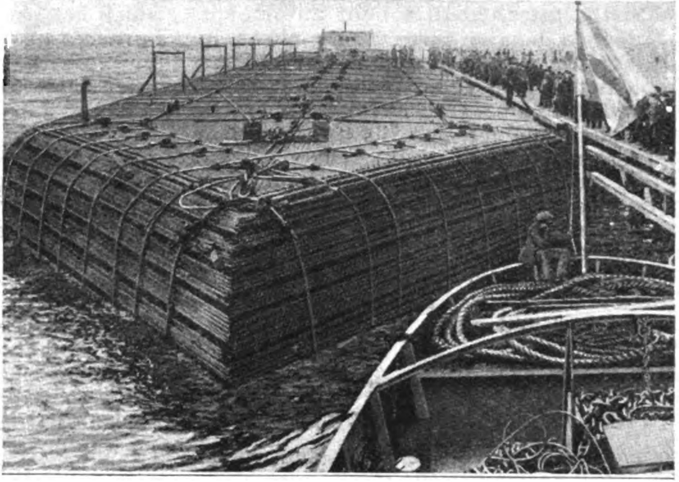
AMERICAN PHOTOGRAPHERS MAKE RECORD IN EUROPE

Although they were seriously handicapped by the lack of accommodations, the American Photographic Force distinguished itself and accomplished a record task when it turned out 9,000 prints in 16 hours during the offensive in the Argonne district. Altogether, over 100,000 prints had to be finished in four days, most of them having been taken by French airmen. After traveling all night to reach their headquarters, the Yank photographers proceeded to convert a dilapidated brewery shed into a dark room, and an hour later had started their sleepless job. All the water for the work had to be carried some distance in buckets.

While most of the regular photographic planes were employed in observing and directing artillery fire, several American planes "shot" the results of heavy-artillery fire. The photographs were of greater value than one would realize, as they caught the complete activities at the time and the accurate number of men and guns on the field, and indicated maneuvers that were in progress.

BIG RAFT OF SWEDISH LUMBER MAKES LONG JOURNEY

An immense raft of lumber tied up ~~to~~ the wharf in the harbor of Copenhagen, Denmark, recently, after having journeyed the full length of the Gulf of Bothnia and the Baltic Sea—approximately 1,000 miles. Six months were consumed in making the raft, which was built at Harparanda, a town in northern Sweden, on the Finnish border. It measured 393 ft. long, 57 ft. wide, and 26 ft. high, about three-eighths of its height being visible above the water. A crew of seven men accompanied it on its long voyage.



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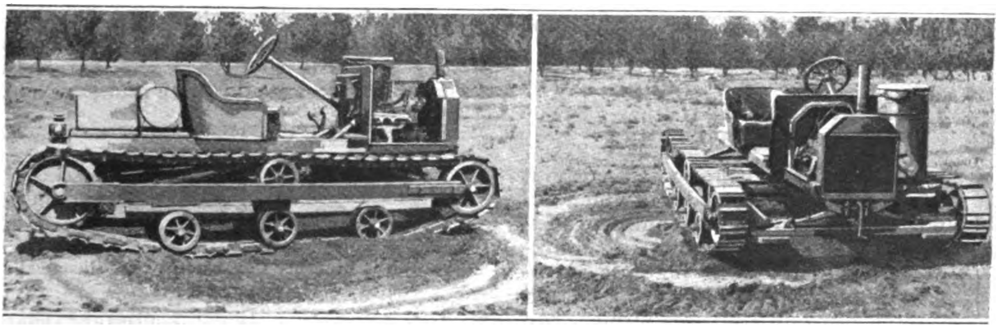
Raft of Lumber, 393 Feet Long and 57 Feet Wide, Which was Towed from the Upper End of the Gulf of Bothnia to Copenhagen Recently

"BABY TANK" USED AS TRACTOR ATTACHMENT

Tractor attachments for light motor cars are more or less familiar as a class, but one such contrivance, originally designed experimentally for war purposes and now assigned to farm work, differs at least from the conventional apparatus.



Ability to Go Almost Anywhere, Economy of Fuel and Oil, Moderate Initial Cost, Easy Attachment and Operation—These Are Some of the Advantages Claimed for the Automobile-Tractor Combination Pictured Above

It consists of a broad frame, supplied with creeper treads, on which a car is mounted after the wheels and front axle have been removed. Driving connection is made through the rear axle. A governor, auxiliary cooling system, and special oiling equipment fit the car for heavy duty. With the attachment, a light automobile is able to handle three 10-in. plows in average soil with ease, and pull other farm implements with equal facility. It turns around in its own tracks like other creeper-tread machines, is able to negotiate almost any kind of ground that is likely to be under cultivation, and maneuvers commendably. Complete, the outfit weighs about 3,000 lb. In width the attachment measures 72 in., while the top of the track is 26 in. above the ground. The combination is said to be economical of fuel and oil.

LONG-SPOUT OILERS PROMOTE SAFETY AND SAVE TIME

In oiling overhead bearings, and others not easily accessible, the use of a stepladder and the danger of accident are alike eliminated by employing an oiler having a spout several feet long. Above the handle projects a pump by which the oil is elevated in the spout, the plunger being operated by pressure of the thumb. Since the spout normally is full of oil, just the amount desired—a drop or a teaspoonful—can be discharged by actuating the plunger. Oilers of this type are made with spouts up to 15 ft. long.

GAS FURNACES MELT METAL WITHOUT CRUCIBLES

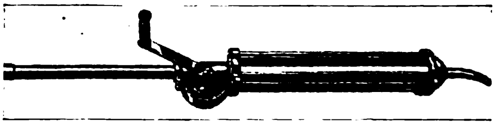
Gas furnaces for melting metals without the use of crucibles are a development of the shortage of crucible graphite in Europe. The fuel is gas with a preadmixture of air, which in one plant is introduced at a pressure of 10 to 25 lb. per square inch. For temperatures higher than 1,200° C., the air is preheated. In the ladle type of furnace, the fuel gas is admitted tangentially, usually to two burners, the flow being in a circular direction. In the drum type, the arrangement of the burners and outlets is such that the gases pass through the axis of the drum. Air heaters of gas piping receive the waste gases, using them for preheating the pots which are prepared for the molten metal. Furnaces of this kind have been operated for more than two years without repairs other than the maintenance of the masonry.

SMOKE IN EIGHT COLORS FOR MILITARY SIGNALS

Smoke of eight distinct colors, vivid enough to be identifiable at night, is the product of experimental research work undertaken by an American army chemist. Colored-smoke signals are largely used in aerial bombing operations. The smoke-producing chemical is ignited when the bomb to which it is attached leaves the airplane, fluttering a 30-ft. tail of smoke all the way down and continuing to emit visible vapors for some time. In burning, it gives off light sufficiently brilliant to reveal the color of the smoke column for several miles at night in clear weather, even if dropped in water. This enables the following airplanes to observe the accuracy of the hit and judge the range. Colored smoke had been previously produced by European signalers, but the American army and navy wanted something better and found it.

QUICK-ACTING CRANK-OPERATED OIL AND GREASE GUN

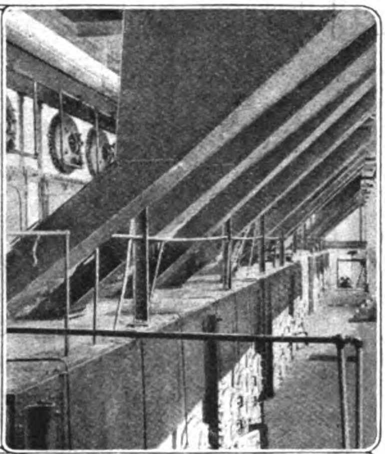
For motor-car use, a quick-acting grease and oil gun of moderate cost with all moving parts inclosed, making it a clean apparatus to handle, has been introduced. It is a crank-operated, gear-action, rack-and-pinion implement that discharges 20 oz. of lubricant with each stroke. In overall length it measures 31 in., while its weight amounts to 9 lb. The barrel is made of seamless steel tubing and supplied with a self-acting tension plunger that will load and discharge heavy or light lubricants with equal facility.



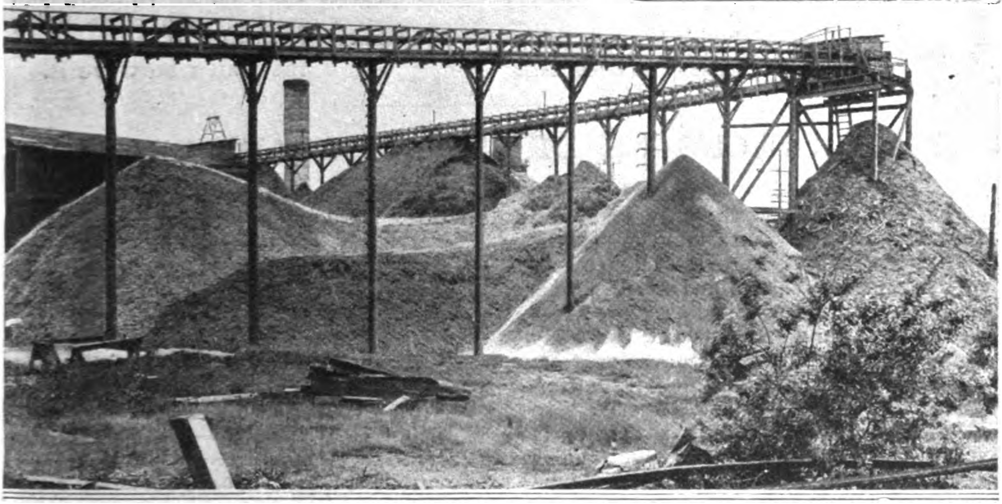
The Gun is Stanchly Constructed to Withstand Rough Usage

SAWMILL WASTE USED IN WESTERN POWER PLANTS

On the Dump, a Rake Operated by an Engine and Double-Drum Hoist Drags the Refuse from the Center Line to the Peak at Each Side of the Conveyor Structure



No Difficulty is Encountered in Firing with Mill Waste, for Conveyors Deliver It to Chutes, Which Feed It to the Furnaces as the Picture Above Illustrates



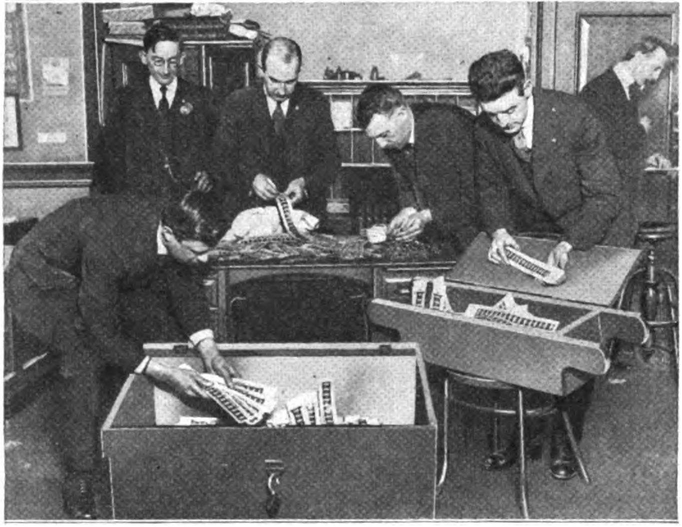
View of a Sawmill Dump Showing a Veritable Foothill of "Hog" Fuel, as the Waste is Known to Millmen, Gradually Building: As a Coal Substitute, This Material is Used Successfully by a Western Power Company

Practice has proved that sawmill refuse is a satisfactory and economical coal substitute for power plants advantageously situated. During the low-water season last summer two auxiliary steam plants of a street railway, light and power company in the Northwest were operated at full capacity with the so-called "hog" fuel. One of the plants, during the three-month period it was in use, generated 4,500,000 kw.-hr. of electricity. Under favorable conditions, it is understood, 200 cu. ft. of the material will develop enough steam for the generation of about 400 kw.-hr. of energy. In using the waste for fuel purposes, chain conveyors are employed to carry it from large dump hills to chutes, through which it is fed to furnaces. Fires are easily kept banked. By use of forced draft, intense heat is produced quickly in the event of an emergency requiring rapid generation of steam.

¶American methods of canning, introduced by missionaries, are now popular in the households of India.

GIVE MILE OF PENNIES TO SALVATION ARMY

The employes of the customhouse at New York, of whom there are several thousand, recently started a fund for the Salvation Army because of its overseas services, and set one mile of pennies as their goal. All contributions were exchanged for pennies at the subtreasury, and the copper coins were then inserted in 1-ft. paper strips prepared for the purpose, each strip having a capacity of 16 cents. In all, 5,280 strips, or $844.80 worth of pennies, were needed to complete the mile, but it was expected $1,000 worth would be received.



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A Mile of Pennies for the Salvation Army, the Gift of New York Customhouse Employes: The Coins were All Placed in One-Foot Strips Containing 16 Cents Each

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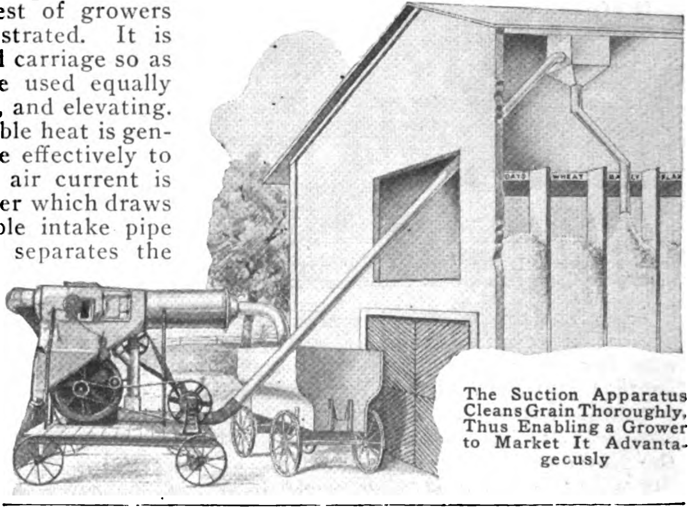
ℭAn English concern has placed on the market a selection of tweeds which are hand-woven by disabled soldiers and sailors, each piece being marked with the name of the man who wove it.

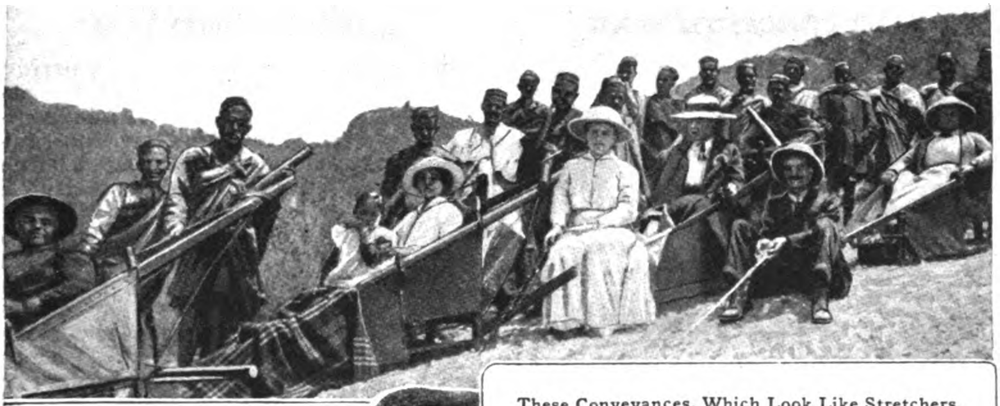
MACHINE CLEANS, DRIES, AND LOADS GRAIN

Among the farm implements that have been developed lately, there is a suction grain-cleaning and conveying apparatus that has drawn the interest of growers who have seen it demonstrated. It is mounted on a four-wheeled carriage so as to be mobile, and may be used equally well for loading, unloading, and elevating. Through friction considerable heat is generated, and this tends quite effectively to dry wet grain. A strong air current is developed by a rotary blower which draws the grain through a flexible intake pipe to a revolving sieve that separates the chaff, dirt, wild oats, mustard and pigweed seeds from it. The impurities are discharged through a chute to a sack, while the grain, cleaned and dried, is elevated to storage bins, or loaded into a wagon or car, as circumstances dictate. As is well known, grain is purchased according to its grading, so that clean grain commands a better price than that which contains chaff and weed seeds. For this reason the machine, which performs its several functions in one operation, enables a grower to market his grain advantageously. The machine is operated at moderate cost, and is supposed to pay the large grower generous profit.

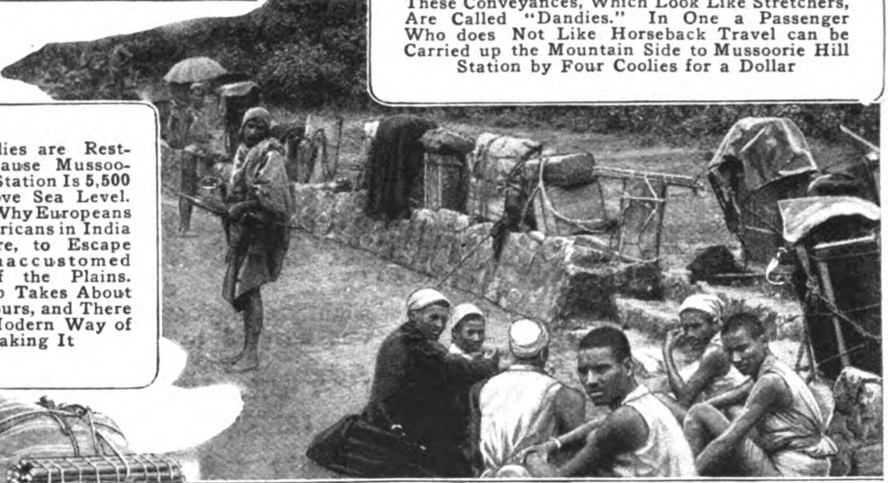


The Suction Apparatus Cleans Grain Thoroughly, Thus Enabling a Grower to Market It Advantageously

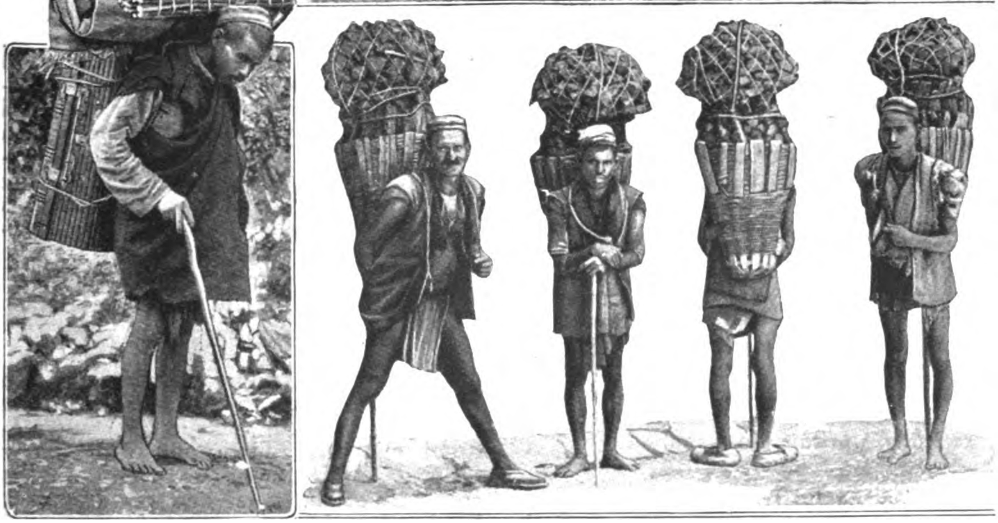
TO INDIA'S SUMMER RESORT BY PRIMITIVE MEANS



These Conveyances, Which Look Like Stretchers, Are Called "Dandies." In One a Passenger Who does Not Like Horseback Travel can be Carried up the Mountain Side to Mussoorie Hill Station by Four Coolies for a Dollar



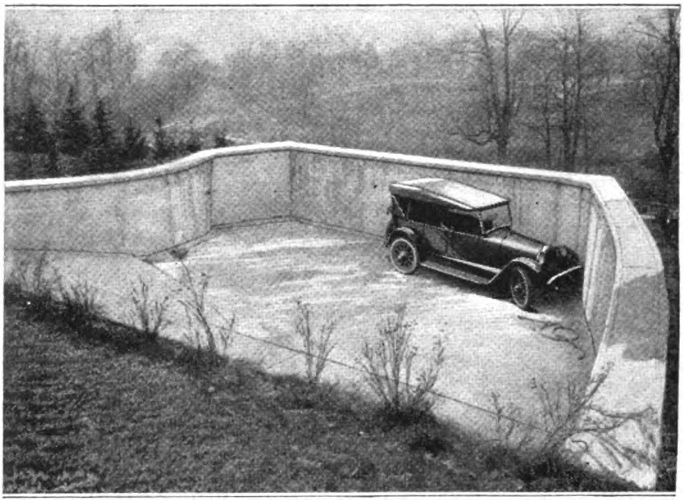
The Coolies are Resting, Because Mussoorie Hill Station Is 5,500 Feet above Sea Level. That Is Why Europeans and Americans in India Go There, to Escape the Unaccustomed Heat of the Plains. The Trip Takes About Four Hours, and There Is No Modern Way of Making It



The Man at the Left is Carrying a Trunk, Bedding, and Other Baggage of a Traveler Who Evidently has Gone Ahead on Horseback. The Other Four Men Have Loads of Coal, Which Is the Only Fuel Used. For Carrying a 200-Pound Load to the Station the Coolies Collect 16 Cents a Trip

AUTO UNHARMED BY PLUNGE INTO CONCRETE TANK

The grounds of a Cincinnati residence were the scene recently of a peculiar automobile accident, which, to the astonishment of all concerned, resulted in practically no injury to the car. In some way the automobile was started down a steep slope back of the residence, and after running 200 yd., plunged into an empty concrete tank, 7 ft. deep, stopping as it struck the far wall. The only damage was a cracked windshield.



Automobile as It Appeared after Its Wild Plunge into This Empty Concrete Tank at the Rear of a Cincinnati Residence: The Walls Are Seven Feet High. The Only Damage Was a Cracked Windshield. An Incline was Installed and the Machine Taken Out on Its Own Power

MANY TONS OF REINDEER MEAT SOLD IN UNITED STATES

The recent selling of 60 tons of dressed reindeer meat in the United States indicates a considerable demand for a food product which compares favorably with beef. According to estimates of Alaskans, there are over 100,000 reindeer in our northernmost territory, and something like five per cent of these are intended for the market. The business of raising them for butchering, in many respects, compares favorably with the raising of other animals, for they live on lichens and cost practically nothing to keep.

Ordinary chalk, treated by a new European process, becomes a cheap substitute for cement, strong enough for housebuilding use. It sets in water and resists the action of moisture.

SNUB FOR SHIP LAUNCHING CHECKS MOMENTUM

Ships launched endwise into a narrow river are in danger of ramming the opposite shore. The workers in an American shipyard operating under such conditions devised a simple method of snubbing the momentum of the ship as it left the ways. On each side of the ways a row of weights was placed along the ground. These weights ranged from two tons near the stern of the ship to 14 tons at the bow, and were separately attached to the ship by heavy iron chains of different lengths. When the ship rushed down the ways one pair of weights after another was taken up, as more and more of its weight floated, bringing it to rest at the desired spot. By slightly changing the weights the system was adapted to ships of different size.

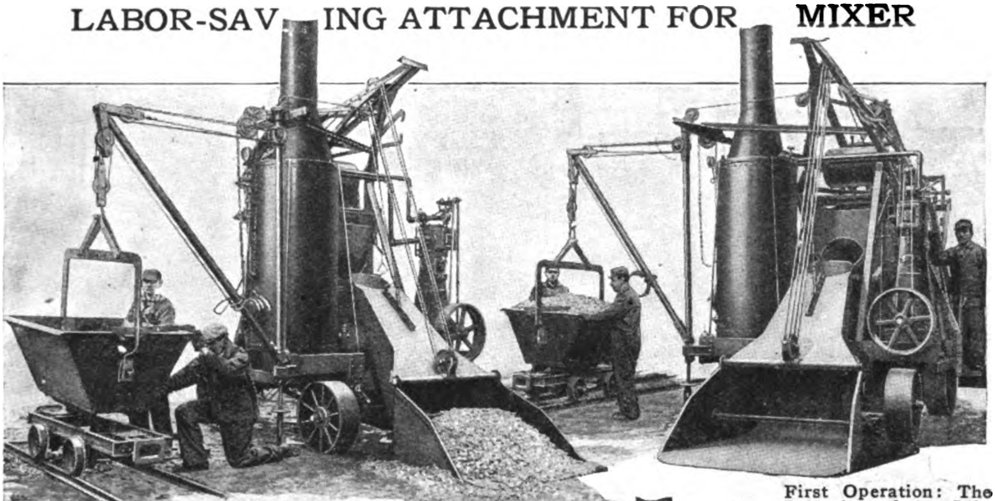
MAY EXTEND MOTORIZED POST LINES IN NEW ENGLAND

In the weeks preceding the holidays, postal officials in a number of New England cities obtained the use of army trucks for carrying package mail between postal stations. The experiment proved so successful in the matter of saving time and labor that further extension of the system may be made. The success of the Portland-New York motorized parcel-post service, established late last summer, has also encouraged postal officials to operate more motor lines.

AIRMAN'S NECK IS BROKEN BUT HE FLIES AGAIN

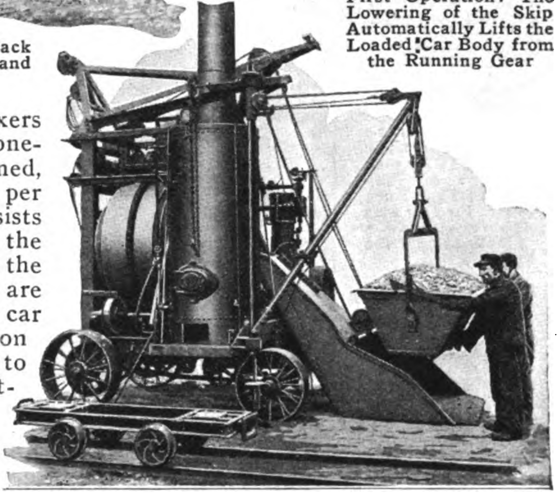
An American flight lieutenant whose plane fell 800 ft. suffered a broken neck, the fifth and sixth vertebræ being punctured and the fourth and fifth partly dislocated. Treatment for several months at a military hospital and the use of a head-and-neck harness so far restored him that he made another flight as a passenger in a military plane. His ultimate complete recovery is anticipated.

LABOR-SAVING ATTACHMENT FOR MIXER



Finally the Derrick Swings the Empty Body Back to Its Truck After the Skip has been Filled, and Another Loaded Body is Brought On

First Operation: The Lowering of the Skip Automatically Lifts the Loaded Car Body from the Running Gear



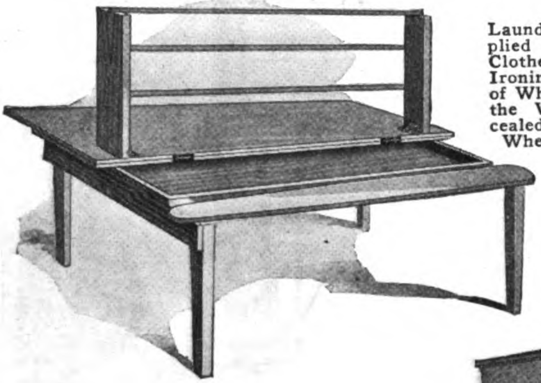
In the Second Operation the Derrick Swings the Car Body over the Skip and a Latch on the Bail is Released, Dumping the Aggregate into the Skip

A new attachment for concrete mixers makes it possible to do the work with one-third to one-half less men, it is claimed, and also effects a saving of about 10 per cent in material. The apparatus consists of a derrick and rigging attached to the mixer, for dumping the aggregate into the skip. Where it is used, the materials are poured, in proper proportion, into a car with a detachable body, which runs on a track from a central loading point to the mixer. Arriving alongside the latter, a bail suspended from the derrick boom is attached to the car body. The lowering of the skip automatically lifts the loaded body from the running gear, after which it is swung around and emptied into the skip. As the operator raises the skip, to dump the load into the drum, the car body descends onto its running gear. Thus much labor in handling materials is eliminated, while by carrying them direct from a central loading place to the skip none is wasted on the ground.

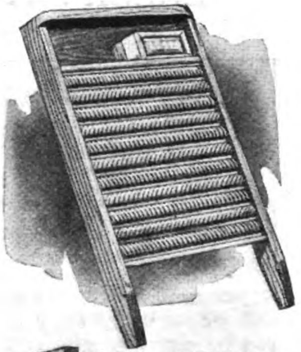
SHIP MORE MEAT TO EUROPE TO SAVE ALLIES' ANIMALS

In order that France, Italy, and the United Kingdom may restore their sorely depleted stocks of native animals, the United States must greatly increase its exportations of meat to those countries, according to Food Administration officials. This will save to these peoples many animals that otherwise would be slaughtered for food. France has lost 17 per cent of its cattle on account of the war, and Italy, 14 per cent. This is serious, not only because of the meat involved but also on account of the lessened supply of milk and the need of the cattle as draft animals. The United Kingdom reports no loss of cattle. The latter country has lost 10 per cent of its sheep and goats; France, 41 per cent, and Italy, one per cent. The number of pigs in France has been reduced 49 per cent, in Italy, 12½ per cent, and in the United Kingdom, 25 per cent. These countries also suffered heavily from other animal losses.

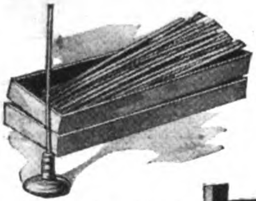
SOME NOVEL AND LITTLE-KNOWN ACCESSORIES



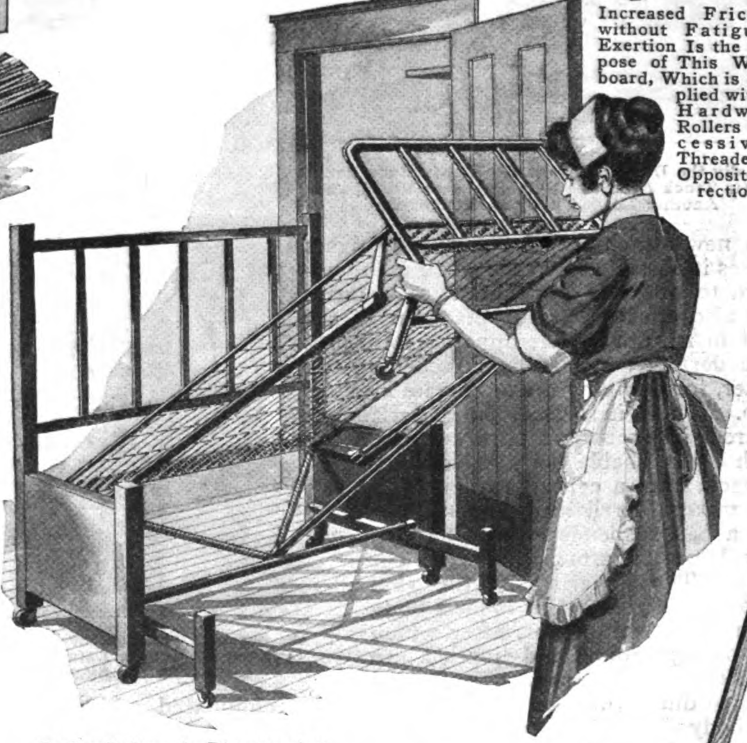
Laundry Table Supplied with a Folding Clothes Rack and an Ironing Board, Both of Which Are Out of the Way and Concealed from View When Not in Use



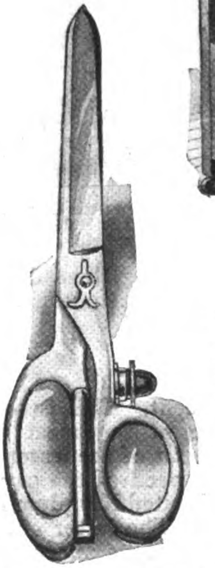
Increased Friction without Fatiguing Exertion Is the Purpose of This Washboard, Which is Supplied with 11 Hardwood Rollers Successively Threaded in Opposite Directions



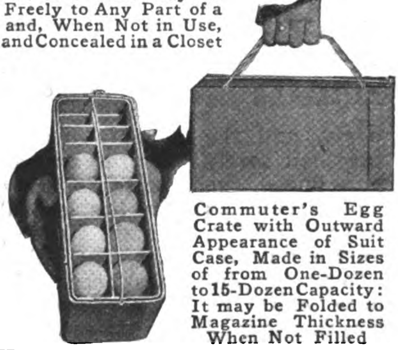
An Inexpensive Gift of Quite Novel Type: A Box of Pine Sticks That Burn with Fragrant Aroma, and a Small Holder for Them



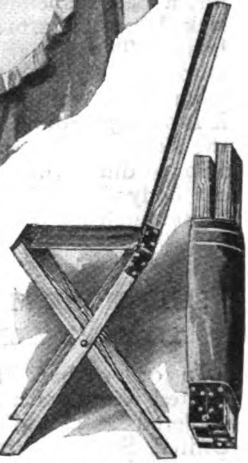
Spring-Balanced Disappearing Apartment Bed That may be Moved Freely to Any Part of a Room, and, When Not in Use, Folded and Concealed in a Closet



Scissors Supplied with a Thimble-Holding Spring and a Marker Fitted in a Hollow Space Formed in the Finger Loop



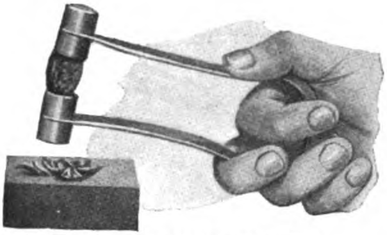
Commuter's Egg Crate with Outward Appearance of Suit Case, Made in Sizes of from One-Dozen to 15-Dozen Capacity: It may be Folded to Magazine Thickness When Not Filled



Comfortable Wood and Canvas Outing Chair That Forms a Bundle Only Four Inches Square and 16 Inches Long, When Folded

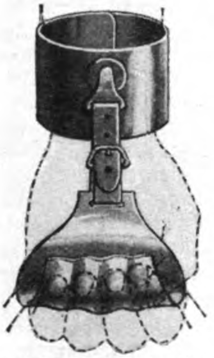
INTENDED FOR THE HOME AND ITS MEMBERS

Serviceable for the Hunter or Camper: An Electric Lantern Supplied in a Compact, Durable Case That may be Conveniently Attached to the Belt

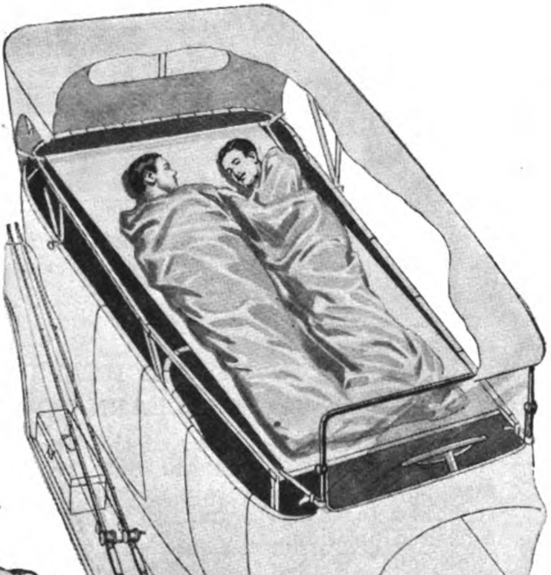


Double-Hammer Cracker That Enables the Kernels of Common Varieties of Table Nuts to be Removed Intact without Appreciable Difficulty

Something New in Men's Neckwear: A Four-in-Hand Tie with Rubber-Fabric Lining Intended to Prevent Undue Wrinkling and Loss of Shape



Grip-Carrying Device Consisting of Wrist Brace Equipped with a Detachable "Hook" Plate That Relieves Strain on Fingers



Comfortable Full-Length Double Bed Suitable for Use in Five and Seven-Passenger Cars: It Rolls into a 25-Pound Bundle, Four Feet Long and Five Inches Thick

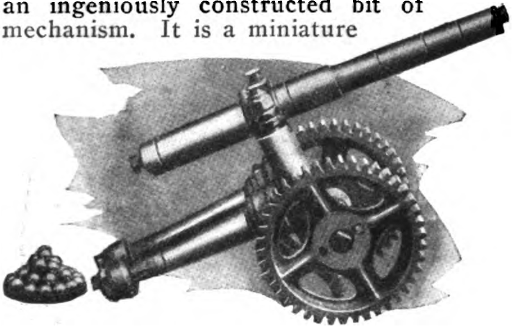
Needle and Pincushion Resembling a Small Cactus Plant, Mounted on a Flat Tray That Forms a Substantial Base

Heavy Combination Armchair with Two Extra Seats Arranged to be Folded and Concealed, When Not Needed, in Compartments Provided in Sides

This Leather Wrist Strap with a Cardboard Insert Provides the Golfer with a Convenient Means of Recording His Score

AUTOMOBILE PARTS ARE USED IN FORMING MODEL CANNON

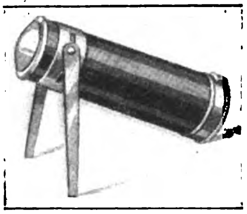
One of the most peacefully inclined artillery pieces in existence is nevertheless an ingeniously constructed bit of mechanism. It is a miniature model of what might pass for a French "75," equipped with special treads and a double limber. More correctly, however, it is a novel assemblage of parts taken from a small motor car.



This Miniature Model of a Field-Artillery Piece Is an Assemblage of Motor-Car Parts

ATTACHMENT FOR ELECTRIC FLASH LAMPS

A new attachment for an electric torch, or flash lamp, consists of two metal legs pivoted to a collar that fits about the lamp near the bulb end. For such work as repairing an automobile at night, the advantage of a support like this to hold a torch in a desired position, is obvious. When not in use the legs are made to lie close to the lamp casing.

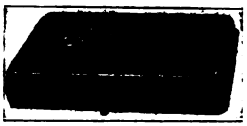


LIBERTY FUEL FAR SUPERIOR TO GASOLINE, IS CLAIM

Of extraordinary interest and importance to motorists, and makers and users of internal-combustion engines in general, are the claims made for the new "Liberty" fuel, vouched for by the Division of Research and Development of the U. S. Corps of Engineers. By means of a chemical process, perfected after seven years of experimenting, a fuel having kerosene as its base has been produced which appears to be superior to gasoline in every way. Distillation plays a part in its production, and its quality can be varied to meet the requirements. It is tasteless, colorless, and the products of its combustion are cooler than those of gasoline, hence a smaller amount of lubricant is required where it is used. It is noncorrosive and so less injurious to motors than gasoline. Furthermore, the fuel leaves no residue, and requires no special apparatus, and its explosion effect is 30 per cent greater than gasoline. A spark or flame is required to explode it. Not only can the new fuel be made more cheaply than gasoline, but more of it is obtained from the same quantity of kerosene.

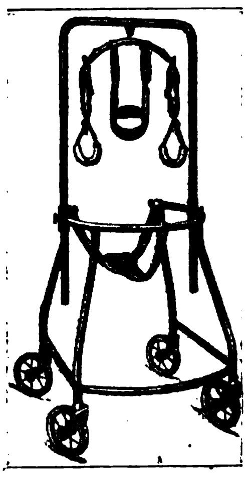
ATTRACTIVE STEEL BOX FOR LIBERTY BONDS

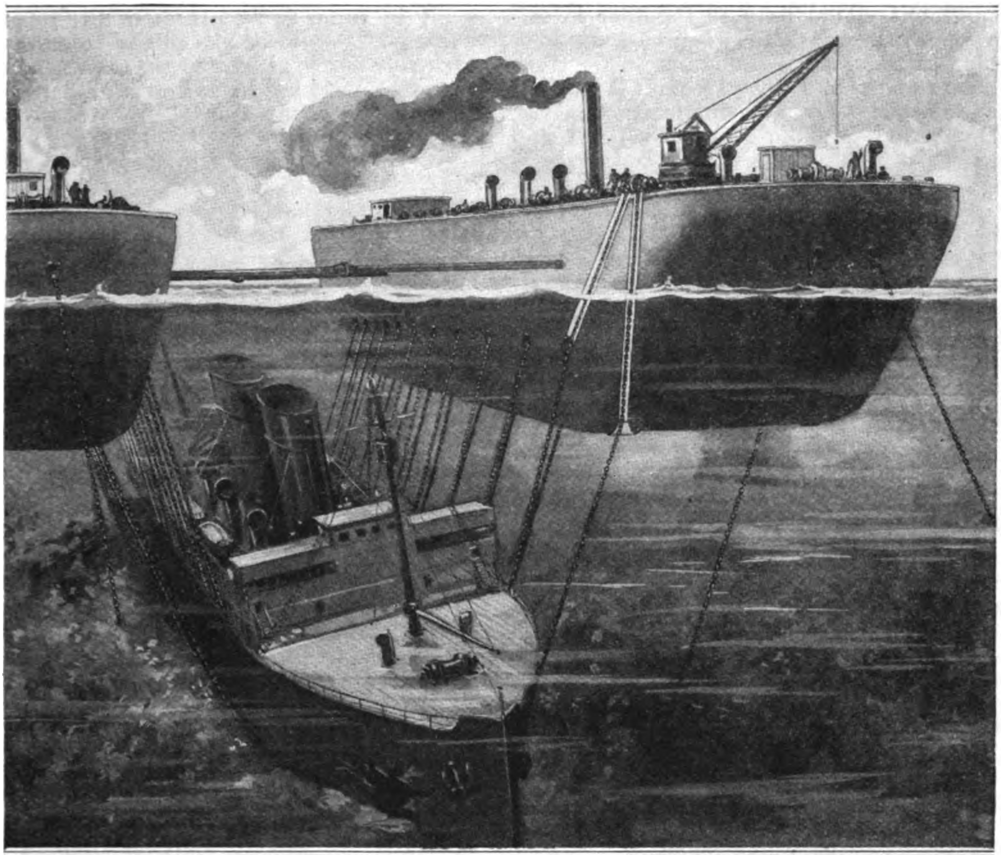
A bond box has recently been put on the market, designed particularly for holders of Liberty, and other, bonds who desire a degree of protection against fire for their securities, but for various reasons do not care to put them in a vault. The box is made of heavy steel, is finished in blue, baked enamel, and is decorated with a patriotic emblem. It measures 11½ by 5½ by 2½ inches.



DEVICE HELPS CONVALESCENTS LEARN TO WALK AGAIN

One of the latest devices that has been brought out for aiding convalescents to regain their ability to walk is an upright frame of steel tubing mounted on four rubber-tired wheels. The lower portion of the frame supports a saddle suspended from straps, while from the upper portion, which is adjustable and arches over the head of the occupant, hang three slings. Two of these are designed to be placed under the arms while the third can be used in supporting the chin.





Chains Passed beneath the Hull, and Others Attached to the Gunwales, Hold the Sunken Ship on an Even Keel While It is being Raised. Booms Hold the Pontoons Apart during the Hoisting Operation

PONTOON HOISTS ARE PLANNED FOR SHIP SALVAGING

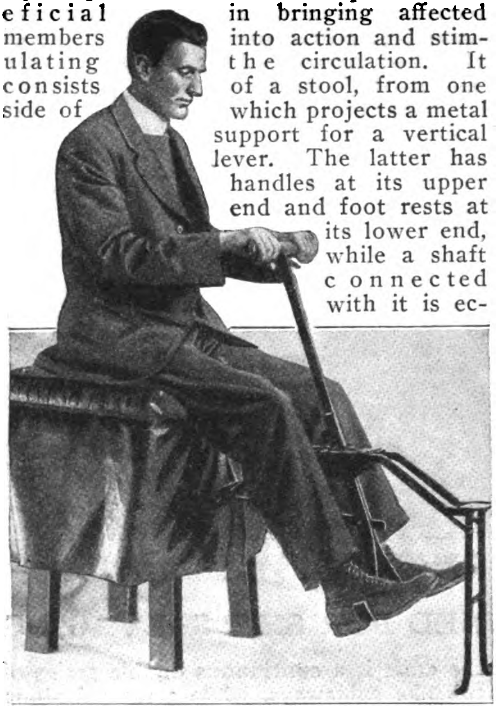
In view of the tremendous losses sustained by merchant shipping during the war, much interest attends the development of improved salvage equipment. Among apparatus that are claimed to embody advantageous features is a hoisting pontoon recently invented by a man long engaged in ship-raising operations.

Essentially the vessel is bargelike in design, broad of beam, and possessed of liberal depth of hull. It serves as a lighter, affords quarters for the wrecking crew, and is equipped with workshops. Tracks for traveling derricks extend along both its sides, while buoyancy chambers are provided beneath the lower deck. These are air-tight compartments which, when flooded, lower the vessel so that it can maintain the desired position in a heavy sea, and, when pumped dry, enable the buoyancy of the pontoon to be utilized for hoisting purposes. Along one side of the craft is a continuous double series of tubelike cableways, while arranged along the deck, adjacent to the ways, is a line of power winches. The cableways are of two types; one extending perpendicularly through the craft, and the other arranged angularly so that its lower opening is not far below the water line. The chains accommodated in the first-mentioned tubes pass beneath the hull of the ship to be raised, the others attaching to the upper part of the hull. Two advantages are claimed for this arrangement. One is that the double hold keeps the submerged ship on an even keel while it is being raised. On the other hand, it is conceivable that a ship might lie at such a depth as to prevent divers from passing cables beneath it, and still not be too far down to preclude attachments being made at the gunwales.

As is quite obvious, at least two of the pontoons would be used together in salvage work, one being stationed on each side of the wreck. Booms hold the pontoons apart and away from the sunken ship while they are operating opposite each other. In the event of a large ship being in hand, two or three of the hoisting vessels would be placed end to end on each side. It is estimated that two 260-ft. pontoons working in unison would exert a lifting force of from 12,000 to 14,000 tons.

BENEFICIAL EXERCISER FOR PARALYTICS

An exerciser designed for a partly paralyzed person is said to have proved beneficial in bringing affected members into action and stimulating the circulation. It consists of a stool, from one side of which projects a metal support for a vertical lever. The latter has handles at its upper end and foot rests at its lower end, while a shaft connected with it is eccentrically attached to a flywheel under the seat. The patient pushes the handle backward and forward, placing the feet on the foot rests, and after the wheel is once started, it is an easy matter to keep the apparatus going.



An Exerciser for Partly Paralyzed Persons: The Horizontal Shaft Shown Connects the Lever with a Flywheel Concealed under the Seat. When Once the Wheel is Started, Little Effort is Needed to Keep the Apparatus Going

REPORT ON "HAIL RODS" NOT FAVORABLE

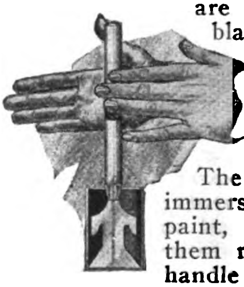
In recent years extensive use has been made of "hail rods" in the vineyards in the region of the Gironde, France, it being claimed that they furnish protection against hailstorms. Recently an investigation of their effectiveness covering several years has been made and it has been found that hailstorms have occurred in the neighborhood of many such installations. Some persons contend that there has been an absence of these storms since they set up the rods but the investigator points out that this may be mere coincidence. While reserving final judgment as to the rods, the report calls attention to the fact that in this region only one thunderstorm in five is accompanied by hail, and that often there will be an entire absence of hail for several seasons, following two or three seasons marked by hailstorms.

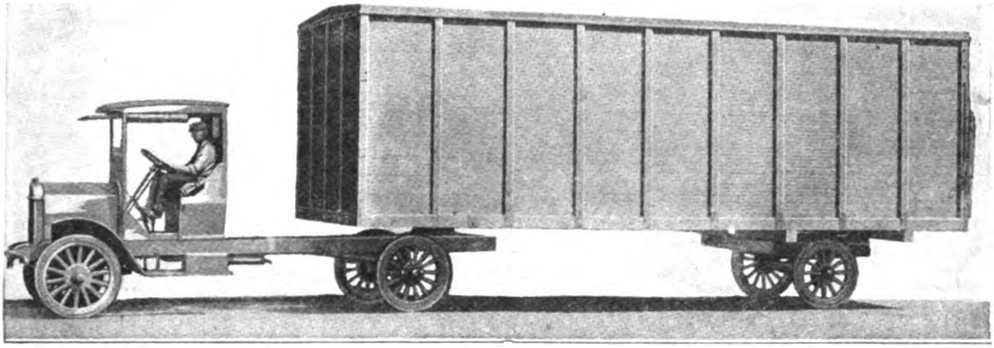
PLAN TO CLASSIFY ATHLETICS SCIENTIFICALLY, PROPOSED

All athletics should be reclassified according to their effects on the heart, and other vital organs, in the opinion of a naval officer who has given the subject much study. The emphasis given to certain sports in high school and grammar school, because they are the most popular, he declares to be most injurious. He advocates that each child in grammar school be assigned to the physical activity best suited to his needs, and this should be determined by his family history, his personal record as to illness, his physical type as determined by height and weight with relation to age.

HANDY DEVICE FOR MIXING PAINT

A handy paint mixer has recently been patented, consisting of a handle to which are secured two metal blades, intersecting each other at right angles. The lower portion of each is of dovetail shape, while above it is a pair of wings. The device is operated by immersing the blades in the paint, and then revolving them rapidly by placing the handle between the palms of the hands and moving them back and forth, as if rubbing them together.





A New Adjunct of the Air-Craft Industry: A Motor-Truck Outfit Designed Especially for Carrying Aeroplanes and Aeroplane Parts. The Body Is 25 Feet Long

MOTOR OUTFIT FOR CARRYING AEROPLANES AND PARTS

The recent appearance of a motor truck and trailer for carrying aeroplanes or aeroplane parts is one of the evidences of the growing importance of the air-craft industry. The body of this trailer is almost as big as a box car, measuring 25 by 10 by 7 ft. These dimensions permit the carrying of passenger planes of many different types, unassembled. Access to the interior can be had only at the rear, where a door with a suitable lock is provided. The frame of the body is of wood and the walls are ceiled on the inside.

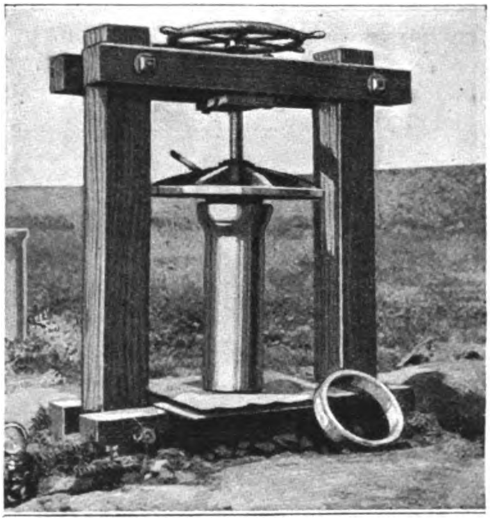
PERPETUAL LICENSE NUMBERS FOR COLORADO AUTOS

A license-number plate for automobiles, indicating the fee paid by the owner for the license, has been adopted in Colorado, which can be used year after year. At the right-hand end of the numbered metal plate are grooves for inserting a metallic disk, which is changed annually and bears the state seal and year date. Holding it in place is a metal letter—A, B, or C—the letter used indicating the license fee paid, and enabling any observer to tell if the payment corresponds to the size of the car.

ℭAn English scientist has made investigations which indicate, it is said, that the coal and shale dust inhaled by miners is rapidly eliminated from the air passages by special dust-collecting cells which break up the dust particles and carry them away without causing serious injury. Quartz dust, however, being made up of sharper particles, is not so easily eliminated and is more harmful.

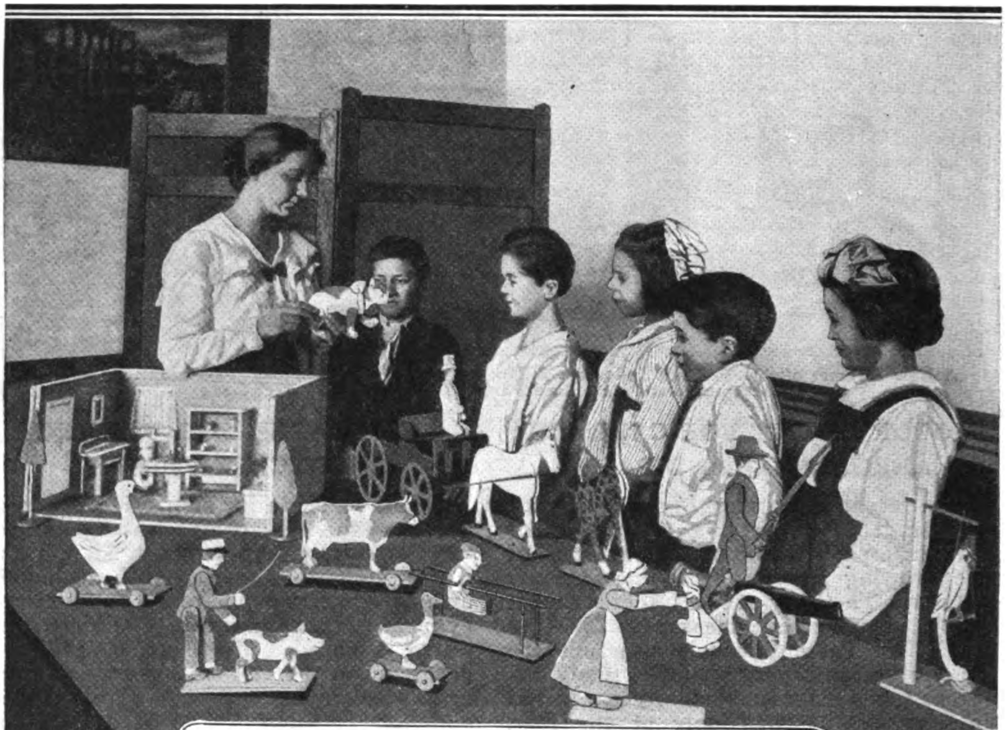
APPARATUS FOR TESTING CONCRETE PIPE

A new machine for subjecting concrete pipe, and the like, to high water pressure, for test purposes, consists of an upright frame supporting a head with a smooth under surface, which is raised and lowered by means of a handwheel. The pipe to be tested is placed, bell-end up, beneath the head, and in the bell is placed a cast-iron ring with rubber packing on its upper and lower faces. The head is then pressed down onto the ring, making a water-tight joint. The pipe is filled with water through a suitable inlet at the base and the pressure made as great as desired. A gauge enables the operator to watch the progress of the test. An air and a water outlet are also provided.

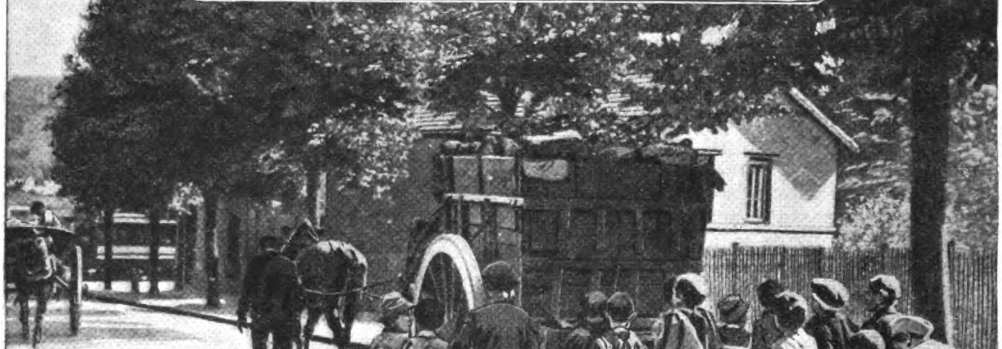


Apparatus for Subjecting Concrete Pipe to Hydraulic Tests: Water under High Pressure is Forced into the Pipe from Underneath

CHILDREN AT WORK AND PLAY HERE AND ABROAD



No Toys are Enjoyed Like Those Children Make Themselves. This has been Shown in One of the Cincinnati Schools Where the Above Picture was Taken. With the German Makers' Products in Disfavor, Toy Making has been Introduced in the Manual-Training Department of the Cincinnati Schools, and the Boys and Girls Shown Here Are Some of the First Who have Had the Fun of Actually Making Playthings. Old Cigar Boxes and a Little Paint Are the Materials Used



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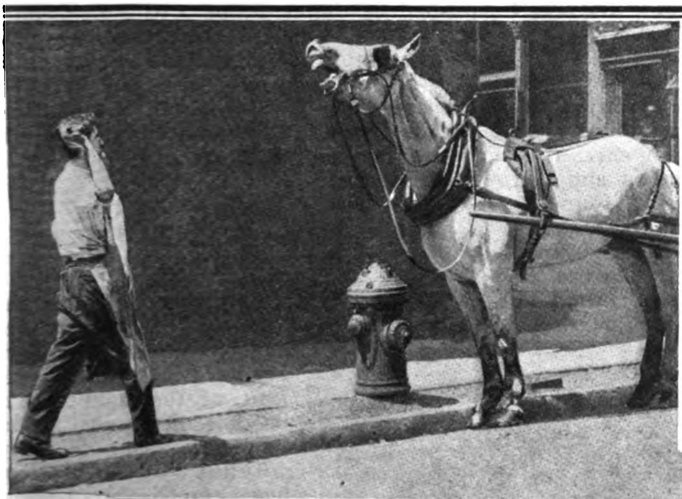
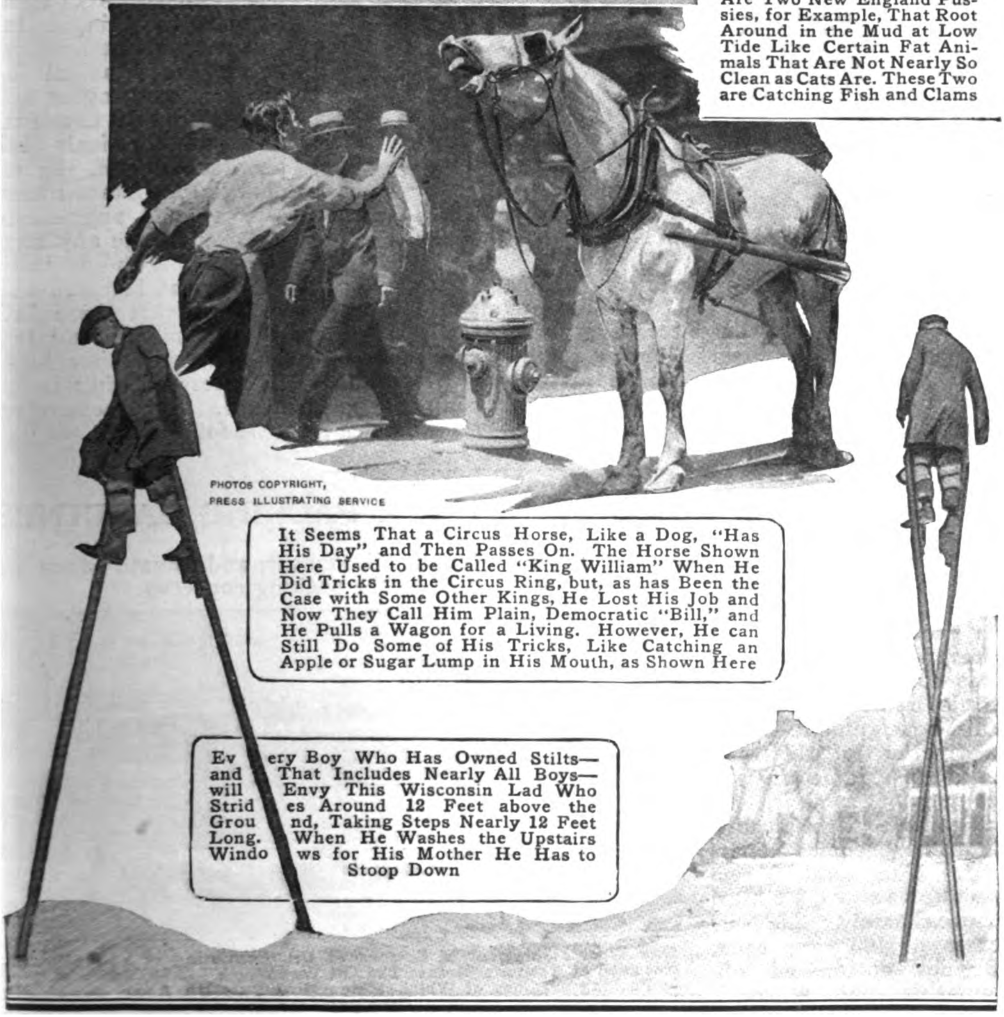
Here Are Some Little Children in France, Where Many Kinds of Material—Especially Coal—Are Still Hard to Get. They are Following a Big Coal Cart, Hoping to Pick Up Some of the Lumps, if Any Fall Off, and Take Them Home in Their Baskets. That Shows How Scarce Coal Is in France, Nowadays

AND ANIMAL PICTURES OF INTEREST TO THEM



Sometimes Cats Learn Surprisingly Bad Habits. Here Are Two New England Pussies, for Example, That Root Around in the Mud at Low Tide Like Certain Fat Animals That Are Not Nearly So Clean as Cats Are. These Two are Catching Fish and Clams



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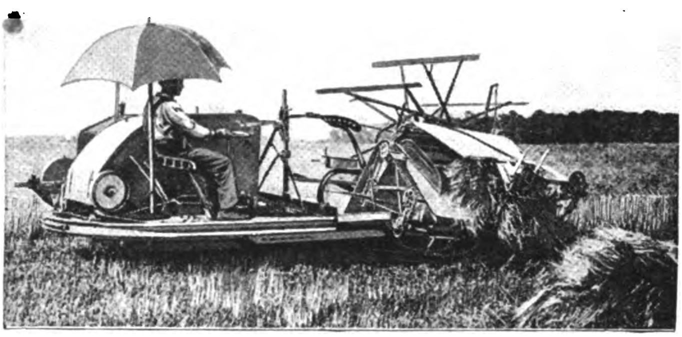
It Seems That a Circus Horse, Like a Dog, "Has His Day" and Then Passes On. The Horse Shown Here Used to be Called "King William" When He Did Tricks in the Circus Ring, but, as has Been the Case with Some Other Kings, He Lost His Job and Now They Call Him Plain, Democratic "Bill," and He Pulls a Wagon for a Living. However, He can Still Do Some of His Tricks, Like Catching an Apple or Sugar Lump in His Mouth, as Shown Here

Every Boy Who Has Owned Stilts—and That Includes Nearly All Boys—will Envy This Wisconsin Lad Who Strides Around 12 Feet above the Ground, Taking Steps Nearly 12 Feet Long. When He Washes the Upstairs Windows for His Mother He Has to Stoop Down

NEW ONE-WHEEL FARM TRACTOR MAKES RIGHT-ANGLE TURNS

Novelty of design is found in a new farm tractor that is able to turn in a four-foot radius. The machine is mounted on one large drive wheel, which carries almost all of the weight, and is supplied with a pair of small casters. A four-cylinder, 30-hp. motor is employed. The driving is accomplished by chains from a jackshaft. The outstanding feature of the tractor is that it can be turned at right angles. This enables, for instance, a square cut to be made when a binder or mower is used. Another interesting point is that the machine pushes a binder, thereby enabling a disk to be attached at the rear to furrow the soil as the grain is reaped. Likewise a grain drill can be pushed by the machine and a drag pulled at the same time, so that two operations are accomplished simultaneously. Ordinary horse-drawn implements are suitable for use with the tractor. The machine weighs about 5,000 lb. and has a channel-iron frame that is 8 ft. 2 in. long and 6 ft. 10 in. wide.



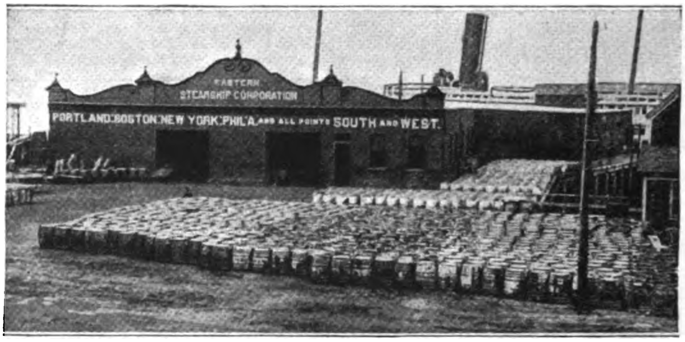
Among the Several Novel and Advantageous Features Possessed by the New Tractor Is Its Ability to Turn at Right Angles. Most of the Weight of the Machine is Balanced on Its One Big Drive Wheel

NEW DRY-CELL BATTERY IS RECHARGEABLE

Exceptional claims are made for an entirely new type of dry-cell battery recently put on the market, it being the contention of the makers that it will not only retain its maximum efficiency without deterioration, but can be recharged from 10 to 12 times. Instead of manganese ore being the principal ingredient as in other batteries, a special combination of chemicals has been substituted. In recharging, it is not necessary to add any chemicals or change any electrodes. With a rated capacity of 12 to 15 ampere-hours, it is claimed that these batteries will carry a four-ampere load two and three-tenths hours, and other loads correspondingly in excess of what is the common performance. For recharging, special rules must be followed.

THOUSAND BARRELS OF OIL FOR PACKING SARDINES

In one week during the past season there arrived at Eastport, Me., 1,000 bbl. of cottonseed oil for use in packing sardines. At prevailing rates, the oil was worth $85,000. When it is remembered that this consignment is but a fraction of the total used in Maine in the course of a year, the magnitude of the sardine industry becomes apparent. The total Maine pack has reached approximately 2,800,000 cases of 100 cans each. Besides cottonseed oil, quantities of mustard, peanut oil, vinegar, and tomato sauce are used by the packing concerns.

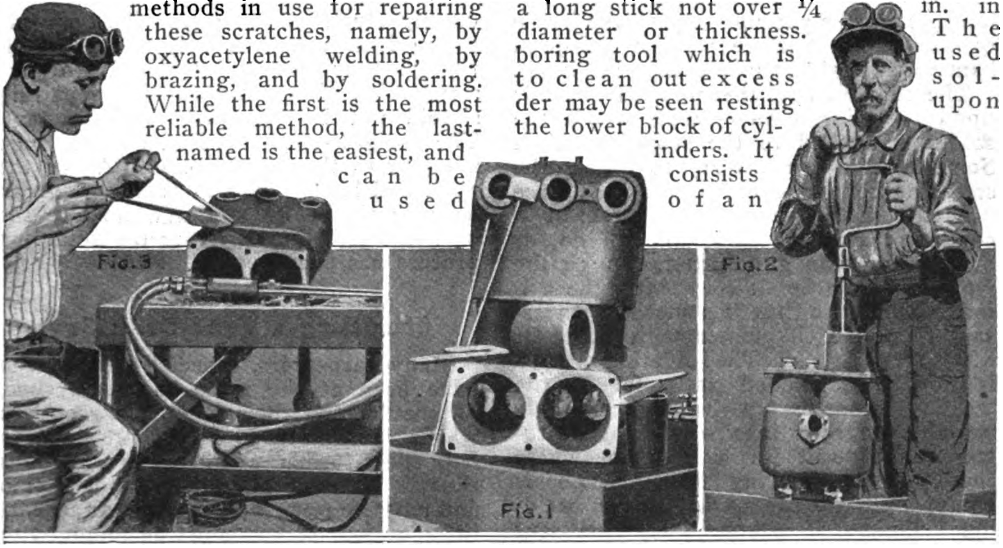

EASTERN STEAMSHIP CORPORATION
PORTLAND·BOSTON·NEW YORK·PHIL'A AND ALL POINTS SOUTH AND WEST

One Week's Shipment of Cottonseed Oil, Consisting of 1,000 Barrels, Received at Eastport, Maine: The Oil Was Worth $85,000 and was Used in Packing Sardines of Which Maine Now Puts Up About 280,000,000 Cans per Year

Scored Cylinders Repaired by Soldering

By DAVID BAXTER

REPAIRING scored cylinders in automobile engines is a somewhat difficult job, and one which requires some skill, by whatever method it is attempted. Until recently, it was considered that cylinders which were badly scored required reboring and fitting with oversize pistons. However, there are now at least three methods in use for repairing these scratches, namely, by oxyacetylene welding, by brazing, and by soldering. While the first is the most reliable method, the last-named is the easiest, and can be used where the apparatus necessary for either of the other methods is not available.



Solder can be Used for Filling Up Scored Places in Automobile Cylinders and for Repairing Cracked Water Jackets. The Apparatus Required is Not Expensive

The soldering method may, however, make use of some of the same apparatus as is used in welding, if this is available. The welding torch may be used for heating the soldering copper, and the cylinder should be heated preparatory to soldering, in the same way as for welding, except that the temperature required is not so high.

The tools needed are shown in Fig. 1. Leaning against the top cylinder casting is the soldering copper, which consists of a small piece of copper, fastened on the end of a long iron rod, about 5/16 in. in diameter and 18 in. long. The copper itself is ½ by 1¾ by 2 in. in size. It is bent or curved to fit the inside of the cylinder. The surface is polished and tinned. Beside the soldering copper stands the stick of solder. This is ordinary half-and-half tin-lead solder, with a little more tin added. For this purpose it should be cast into the form of a long stick not over ¼ in. in diameter or thickness. The boring tool which is used to clean out excess solder may be seen resting upon the lower block of cylinders. It consists of an old piston sawed off at the solid end, with a shank attached to a pin in the piston-pin holes. The other end of the piston is notched clear around, so that it cuts out the excess solder. The glass to the right contains the solution with which the surface of the steel is cleaned before tinning. A good solution consists of equal parts of blue vitriol and sal ammoniac, dissolved in water.

The process is as follows: First clean thoroughly the scored place, and a strip 1 in. or so wide on each side of it, with emery cloth or steel wool. Then place the scored cylinder over a gas burner or suitable heater, until it is warm enough to fry the soldering solution. Don't get it hot enough to crack the casting. While this is being done, the special soldering copper should be heated. Get it hot enough to melt the solder, but not so hot as to spatter it. As soon as the copper and cylinder are ready, apply the solution to the scored surface, making sure that every portion of it is moistened with the liquid. When dry, fill the score with melted solder by inserting the stick of solder into the cylinder and putting the hot copper against it. After the score is entirely filled with solder, allow the whole thing to cool; then reheat the copper and smooth out the solder. Work the copper back and forth or sideways like a trowel, until every crevice is full of solder. Allow the cylinder casting to cool again, and then employ the hand borer, as shown in Fig. 2. The boring tool should fit the cylinder quite snugly; if it is too loose, it may be possible to peen the inside of the piston surface with a ball-peen hammer even all around, so as to expand it.

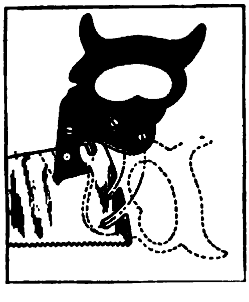
The reliability of this method depends upon the thoroughness with which the solder is applied to the scored portion. Sometimes it is necessary to reheat the soldering copper several times during the process. Either a welding torch or a common tinner's blowtorch, will do, or even a common gas burner, though the work will then be slower. After the cylinder is bored out, it is sometimes necessary to polish the solder with waste or with a scraping tool. The soldering method is not recommended as equal to the welding process, but it is particularly valuable on rush jobs where the customer cannot wait for welding, or where there is no welding shop which is equipped to do the work. When welding cylinders, it is sometimes necessary to put in new pistons, as the cylinder has to be bored oversize; with the soldered cylinder, the old pistons can be used.

The question which will occur to the mechanic is whether a soft solder can be relied upon to remain solid under the temperatures prevailing in an engine cylinder. This is unquestionably the weak point of the method, but it should be remembered that the lower part of the cylinder, where the worst scores often occur, does not get so hot as the combustion chamber above, and that in any case the inner surface of the cylinder does not reach anything like the temperature found at the center of the piston head, unless the cooling system is allowed to run dry. But in deciding whether to apply the soldering method, the location of the scores should be considered, as well as the probability of the engine being used under conditions which would cause it to heat up greatly.

Figure 3 shows another application of the soldering method, namely, repairing a crack in the water jacket of a cylinder casting. This is not recommended for great reliability, but it is often useful in a pinch. The process is very similar to that described above, except that the common soldering copper is used. The line of the crack is cut out to a V-shaped groove, as for welding. This groove is made with a cold chisel, almost to the full depth of the metal's thickness, and about ¼ in. wide at the top. The groove is painted with the acid solution; it is then filled with melted solder and smoothed down with the soldering copper. Again, the chief requirement is to see that the soldering powder is thoroughly stuck to the iron. The appearance of such jobs is very neat, but although they have been known to give satisfaction for months, the repairing should not be regarded as permanent. The upright casting in Fig. 1 shows such a repair to the water jacket. Along the right and lower edges of this casting can be seen the white marks which are the only visible indication that the soldering process has been applied.

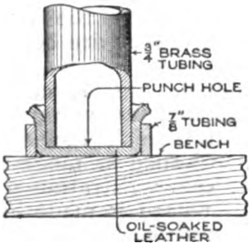
Sharpening a Worn-Down Saw

Many carpenters, especially those who have been at the trade for some time, number among their tools a saw or two which, through many filings, are worn to half their former width. The handle is thus in the way of the saw-filing clamp and must be removed for filing, or at least three or four screws must be removed to permit the handle to be turned back. This consumes time, and, since each screw consists of two parts, often results in the loss of a needed and not easily replaced screw. An easy way out of the difficulty, and one which does not harm the saw in any way, consists in enlarging the holes of all except the uppermost screw to notches leading to the edge of the saw blade, these notches being shaped in conformity with the circle traced by each



screw when the handle is pivoted on the one at the top. This is easily done by removing all but the pivot screw and swinging the handle about on it, while a pencil is held against first one, and then the opposite side of each screw hole, thus marking the path of each over the blade. The slots can then be cut out, following these marks. To get a saw thus prepared ready for filing, it is only necessary to give each screw a half turn and swing back the handle.—Henry Simmons, Los Angeles, Calif.

Making Gasoline-Torch Piston Leathers



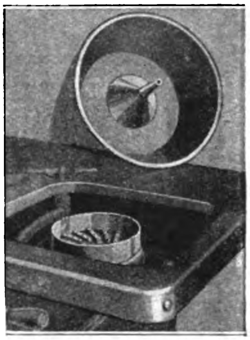
Piston leathers for gasoline torches can be made as indicated in the illustration, by using a short length of ⅞-in. thin brass tubing as a form, and then driving a piece of oil-soaked leather into it with a section of ¾-in. brass tubing, used as a punch. Place the piece of ⅞-in. tubing, which should be about ¼ in. high, on the top of the bench. Lay a piece of leather, the same thickness as the old one, over the top of the ⅞-in. tube. By forcing the ¾-in. tube down, as shown in the picture, the leather will be molded into the form required. It can then be trimmed off evenly around the top of the ⅞-in. tubing ring. The leather should be permitted to remain in the form for a few hours, or overnight if possible, after which it will retain the required shape. A hole should be punched in the middle of the piston leather to accommodate the screw which holds it to the piston head. If, after using, the piston leaks, soapsuds should be poured around it rather than gasoline. If gasoline is used, it will dissolve the oil on the piston leather and spoil it.—L. M. Dyke, St. Louis, Mo.

Old Linen Collars Make Good Marking Tags

From discarded linen collars, excellent tie-on labels, or tags, can be made. The glazed surface which comes about with the repeated starching makes an excellent surface to write upon. A hole is punched at one end, through which a short length of string is twisted. Labels made in this way are very durable, and will not pull away or tear.

Saving Gas in Heating Water

A vessel which will heat water on a gas stove more quickly than will an ordinary pan or kettle, and which will for this reason save gas, can be made by soldering an inverted funnel into the bottom of a tin pan. Nearly the whole portion of the bottom of the pan that is covered by the funnel should be cut away, so that the hot gases from the flame can go up through the funnel as well as around the sides of the pan. It is this double heating that makes the vessel efficient.—Harvey Mead, Scranton, Pa.

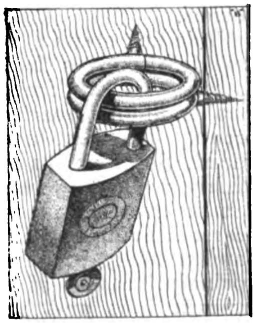


Salt in Whitewash

Where it is customary in the summer months to whitewash hothouse or greenhouse windows to keep off some of the hot rays, it is necessary to clean the windows in the winter time, and it is usually hard to remove the old covering. By putting one gallon of common salt in a barrel of whitewash, a mixture will be made which can be removed easily.

Screw Eyes Carry Padlock

In applying a padlock to a door, the main requirement for the hasp is that it should be fastened in such a way that no screws are exposed when the lock is on; otherwise the lock can be removed by taking out the screws with a screwdriver. An equally effective method of applying a padlock, which does not require the use of a regular hasp, is to insert two screw eyes in the position shown; one in the door, and the other in the door jamb, so that they come close to each other when the door is closed. When the padlock is attached as shown, the screw eyes cannot be unscrewed.—J. H. Norrell, Augusta, Ga.



Testing Seed Corn for Germination

By H. A. FRANKLIN

THE average yield of corn throughout the United States is not far from 28 bu. per acre. There are 4,800 hills of corn to the acre, planted 3 ft. apart each way. Three stalks to the hill and one ear on each stalk would yield 14,400 ears, which, at half a pound to the ear, would make 7,200 lb. or 130 bu. of shelled corn per acre. This is not all theory, for corn-club boys have produced such yields in a dozen different states. The difference between this and the average yield corresponds to the difference between the old-fashioned way of planting by the rule of thumb, and the new way of applying scientific knowledge to the growing of crops.

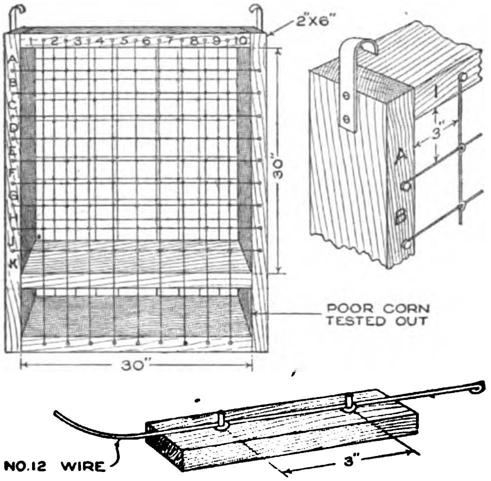


Fig.1

Seed-Corn Ears are Kept in Racks, Each Numbered and Tagged, While the Kernels from It are being Tested for Germination

The first step in the production of large yields of corn is the selection of seed with strong vitality from the best-producing stalks in one year's field for next year's crop. The best-looking kernels may be dead. Some grains of corn that germinate fairly well show weak roots or sprouts. Stalks grown from such seeds fail to have ears. Leaving out the question of poor soil and a badly prepared seed bed, the two principal causes of low yields of corn are vacant hills and barren stalks, both of which may be prevented by thorough ripening, careful curing, and the final process of elimination by testing the germinating qualities of each seed ear in the incubator. Growing three productive stalks to the hill without any skips, or the same ratio when planted in drills, is too near perfection to expect, but intelligent effort, with the assistance of modern machinery and laboratory appliances, will always increase the yield.

The seed-curing rack, here shown, will hold 100 ears of seed corn, each ear in a separate compartment, from the day the ears are selected in the field, through the final ripening and curing processes and the testing of each individual ear for germination, to the final selection for planting; and each of the 100 ears will retain its identity throughout the test.

Each ear should have a card fastened to the butt end of the cob, preferably by a thin, blind staple. On the card is marked the number corresponding with the wire pigeonhole that the ear occupies. These numbers will read A1, A2, etc., using the first 10 letters of the alphabet with the exception of letter "I," as shown in Fig. 1. The same system of letters and figures will identify the five grains from any ear while they are being tested for germination.

The incubator cabinet, Fig. 2, completes the equipment for the scientific handling of seed corn, which includes also a permanent record such as modern farming demands for the registration of pure-bred seed. This record is made by marking the date and result of each germination test on the card that is attached to the cob. The cabinet is used in connection with the curing racks, to test the

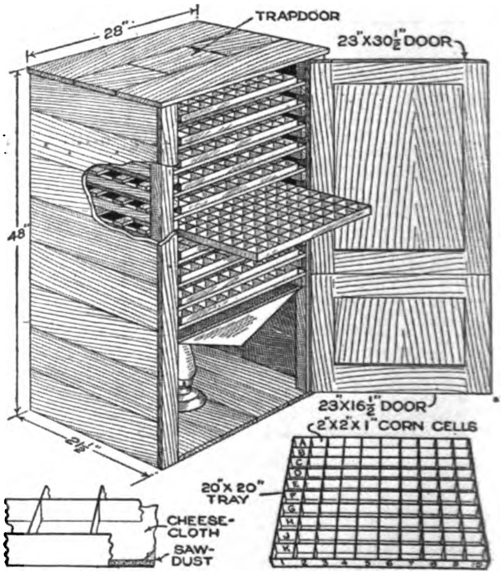


Fig.2

The Testing is Done in an Incubating Cabinet, Where Five Kernels from Each Ear are Kept Warm and Moist by Steam Generated Below fitness of the different ears for seed. Its capacity is 1,000 ears, or equal to 10 seed-corn racks as represented in Fig. 1. The racks and drawers may be numbered correspondingly from 1 to 10, so that, for instance, 9-J-8 will indicate the eighth compartment in row J of the ninth drawer, containing grains from ear No. 9-J-8, which is placed in the ninth rack, row J, eighth space.

This testing cabinet is 48 in. high, 28 in. wide, and 21½ in. deep. The four corner posts are 2 by 2-in. strips. The cabinet is boxed in with sound ½-in. ceiling lumber of the matched variety. The top is also of ceiling lumber, with a trapdoor in the center. The bottom pair of cleats, on the corner posts, are nailed on 15 in. from the floor. The other cleats are 3 in. apart, as shown in the drawing. These cleats support the shelves, and should be of sound material, 1½ in. wide by ⅞ in. thick. The shelves are made of slats so that the temperature will be more uniform, but they must be level, straight, and true.

The tin deflector is filled with water to supply moisture. It also prevents excessive heating of the lowest pan; it distributes the heat in equal amounts on either side of the lamp, and starts it up at the sides of the cabinet to circulate around each pan alike. The heating arrangement is more or less automatic in that each pan receives an average amount of heat, and the temperatures at various heights are as nearly uniform as is easily obtainable. The temperature should be maintained between 72 and 80° F. The trapdoor ventilator in the top lets out the superheated air when necessary. A good lamp of the incubator style furnishes heat, and is not easily put out of service.

The pans should be of No. 24 gauge galvanized iron. They should be made accurately to size, 20 by 20 in., fitted with nine tin partition strips running each way, thus dividing the pan into 100 divisions, or compartments, each 2 in. square and 1 in. deep. The tin partitions are 1 in. high, and the tin strips are 20 in. long. They are cut to the center at intervals of 2 in., and pushed together like the paper strips in an egg carton, and may be touched with solder at the joints to make the racks hold together. They can then be lifted out of the pans and cleaned with boiling water or live steam, after each test, to kill spores.

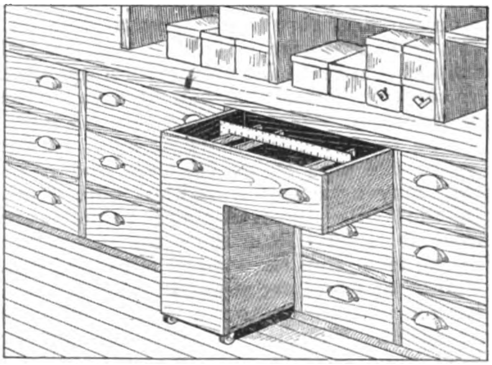
The sides of the various cells are marked on the left with letters and on the front with figures, with a waterproof crayon, the letters and figures corresponding with those on the corn-curing rack. This system positively identifies the five grains in the tester with the ear in the rack.

The front is closed with two doors of the same material as the sides and back; the upper one incloses the pans, while the lower one covers the lamp.

To operate, put warm water in each pan, about ¼ in. deep, and put in five kernels from every ear to be tested in their proper cell. Seeds must have air as well as moisture, so it is better to sift a layer of fine sawdust over the pans, then cover the sawdust with a square of cheesecloth, place the racks in position, and put the kernels of corn on top of the cheesecloth. This cabinet, without the tin racks, may also be used as a sprouter for grain in the winter months, when grain feed is so greatly desired in the poultry yard.

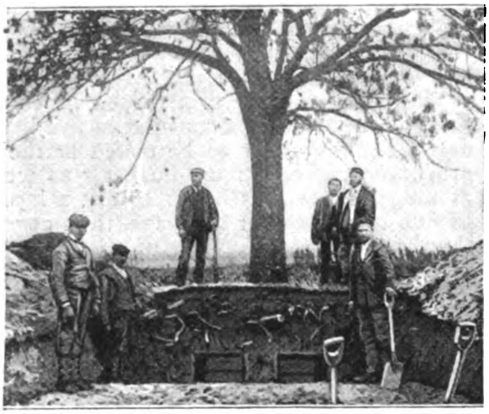
Hardware Store Has Special Drawer for Carpenters' Squares

One of the problems of the retail hardware store is to arrange the stock of carpenters' squares so they may be easily displayed, and yet take up as little room as possible. They are awkward articles to arrange, and no little trouble to the clerks. One store overcame the difficulty in the following manner: A drawer was built to conform to the shape of the squares, and was so constructed that it could be easily rolled out of its pocket in the wall case, displaying the entire line of squares at once. The drawing shows how the drawer was built and how the otherwise dead space below the horizontal section of the drawer was used to house a number of small drawers, thus utilizing the entire space.—L. B. Robbins, Harwich, Mass.


A Drawer Especially Built to Accommodate Carpenters' Squares Is a Neat Device in Any Hardware Store

How a Big Tree Is Moved

It has been known for a long time that even large trees can be moved from one place to another without injury. This must be carried out during the natural resting time of the tree, that is, in the winter. The remover of big trees strives at all cost to avoid injuring the roots more than is absolutely necessary, and to this end a square of soil is cut out all around the tree. On one side, an opening, or slipway, is made, as can be seen in the photograph.


By Digging Out the Ground Properly and Providing Runways of Lumber It Is Possible to Remove Large Trees Successfully

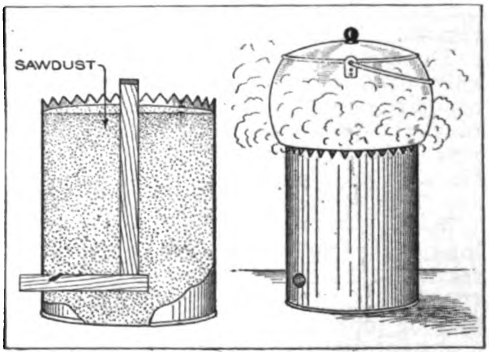
The most difficult part of all is to cut under the tree so as to sever the roots that may have penetrated to some depth in the soil. Several small tunnels are opened up, and from these the separation of the tree from the subsoil is carried out. Planks of wood are slipped under the tree to act as runners on a track which is prepared. The tree is then hauled by horses or, in the case of a very large specimen, by mechanical power. The ropes are placed round the square of earth, as it is dangerous to pull on any part of the tree itself. Before the removal of the tree is attempted, the new position must be ready. Down toward the excavation, a track is cut out so that the tree will travel easily into the new location.—S. Leonard Bastin, Bournemouth, England.

Starting Auto in Deep Sand

A farmer, located in a very sandy country, was sometimes embarrassed because friends who came to see him found that, upon leaving, they encountered a great deal of trouble in getting their cars loosened from the deep sand. After the experience of furnishing to one of his guests a pair of mules and a quantity of heavy planks, he devised a much less troublesome method for the next case. He got from his barn an old horse blanket and spread it on the ground in front of the drivewheels. The difficulty, of course, is the tendency of a heavy machine to bury itself in the sand, by constant efforts to start. As soon as the wheels climb onto the horse blanket, even if they drag it part way down into the sand with them, the burying tendency is checked.—Samuel C. Appleby, Baltimore, Md.

A Stove That Burns Sawdust

A simple stove made of sheet iron, using only sawdust for fuel, will burn a long while on one charge, giving sufficient heat to cook a meal. The stove itself is an iron can, from 6 to 8 in. in diameter, and about the same height. The bottom must be riveted to the sides. A 1-in. hole is cut on one side, 1 in. from the bottom. Around the top of the can, a number of notches are cut, ½ in. deep and ½ in. wide. To start the fire, sprinkle sawdust in the bottom of the can up to the 1-in. opening. In this hole place a round piece of wood long enough to reach a little past the center of the can, and to leave a grasping length outside. Rest a similar piece vertically upon the first one, in the center of the can. Then pack sawdust tightly to the level of the notches in the top. After carefully removing both sticks so as not to jar sawdust into the holes left, stuff a bit of crumpled paper into the 1-in. opening, and light. In a few minutes the whole mass of sawdust will glow with a red heat which will last for a long time.



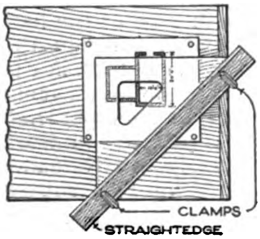
A Simple Sheet-Iron Stove, Which Burns Sawdust, Furnishes Heat Enough to Cook a Meal

Removing Wall Paper with Steam

Stripping wall paper from the walls of a room is a tedious and unpleasant task. The following method has been found to do this work satisfactorily: Remove all furniture from the room and take up the floor covering; place, in the middle of the room, some kind of a portable stove with a big pan of water on top. Light the stove and close all the windows and doors; when the room becomes full of steam, it will soften the paste which has been used for sticking the paper on the wall. After an hour or more of the steaming, it will be easy to remove the paper.

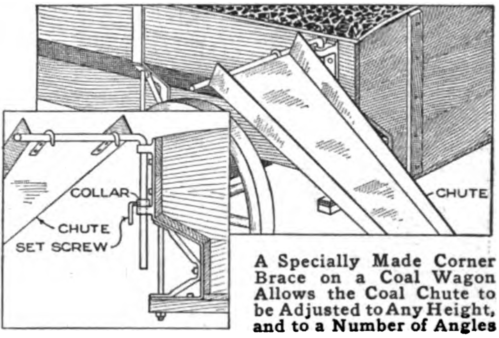
Small Drafting Work Easily Done without a T-Square

Small mechanical drawings, which consist mostly of horizontal and vertical lines, are made most quickly by using, instead of a T-square, a straightedge and the 45° triangle. Clamp the straightedge to the table, diagonally, so that it is below and to the right of the space where the drawing is to be made. Lay the triangle with the long side against the straightedge; the triangle should be large enough so that, as it slides along the straightedge, it will pass over the whole space to be covered by the drawing; that is, the drawing will lie between the straightedge and the line of motion of the vertex of the triangle. If these conditions are fulfilled, all vertical and horizontal lines can be made with the two sides of the triangle; for lines at 45°, 60°, or other angles, other triangles or a protractor will be required, as usual.



Adjustable Chute for Coal Wagon

The ordinary chute used by coal dealers does not always make it possible to fill the customer's bin without carrying. It is often supported by boxes and barrels, but this is not satisfactory. The chute can be made to fit a greater number of cases, and to give better service where used, by making an adjustable support for it on the back of the wagon. This support is really a part of the wagon box, but it allows the chute to be used in a number of positions, and gives it a firmer hold than is obtained by the usual method of hanging it over the edge of the box.

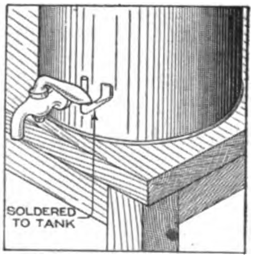


A Specially Made Corner Brace on a Coal Wagon Allows the Coal Chute to be Adjusted to Any Height, and to a Number of Angles

Changing the corner brace of the wagon box to meet the requirements may not be possible; a new brace is more practical. It should be made of heavy iron, the dimensions depending on the wagon and the chute. Two lugs, or ears, on the brace support a heavy iron rod which turns, hinge-fashion, on the lugs. A collar on the rod is provided with a setscrew so that the height of the chute with reference to the wagon box may be regulated. Heavy hooks on the chute fit over the rod, making a steady, firm support. If both back-corner braces are changed in this manner such a variety of positions is possible that the chute nearly always can be used successfully.—M. E. Duggan, Kenosha, Wis.

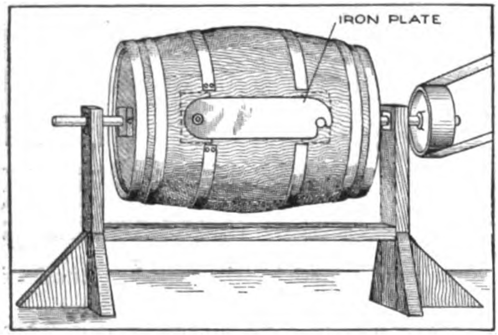
Stop on Faucet Avoids Oil Leakage

Quite frequently the faucet on an oil-supply can, such as is used around a machine shop for storing lard and machine oil, is not provided with a stop, with the result that in closing the cock it is pushed too far, and leakage and waste of oil result. A simple and easily applied stop, which is a successful cure for this difficulty, consists of a strip of metal, bent to the shape shown, and soldered in place so that the end of the handle strikes it, and is thus prevented from moving beyond the closed position.



A Barrel Tumbler for Punch Shop or Foundry

The usual method of removing burs from punched parts or sharp edges, and molding sand from fresh castings, is to tumble them about in a rotating container. Broken pieces of carborundum wheels, emery sand, or some other abrasive, are usually placed in the container to hasten the burring process. The small foundry or punch shop cannot well afford to be without such a tumbler, particularly when one may be easily constructed from a stout barrel. If the parts to be tumbled are light in weight, a drive shaft, 1 in. in diameter, may be used. This rod should be long enough to pass through the barrel and allow about 1 ft. to project from each head, as shown in the sketch. A heavy block of hard wood strengthens the heads where the shaft passes through. A steel pin is driven through the wooden block, and into a hole drilled in the rod, so that the barrel will turn with the shaft. Suitable standards with bearings are provided to support the tumbler, and a pulley is placed on the shaft so the device may be driven from some outside source. Bearings may be made by wrapping the shaft with paper, and casting babbitt around it.



A Tumbler Made from an Ordinary Barrel will Do Good Work in the Small Shop

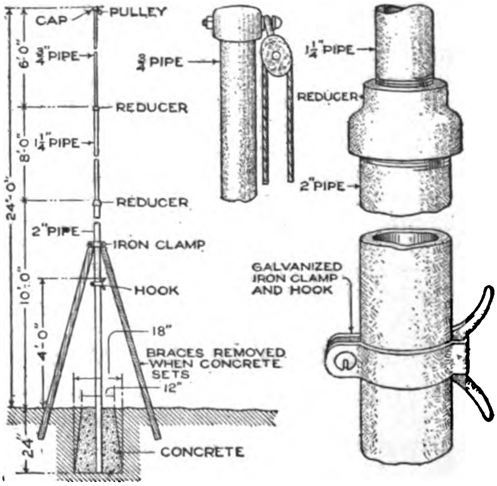
A hole should be cut in the side of the barrel, approximately 2 ft. long and 1 ft. wide. It will be necessary to sever the steel hoops at the point where the hole is cut, but before doing so, nail or screw the hoops to the barrel, near the cut-off point. Thus these hoops will remain to help strengthen the barrel. The cover placed over the hole is made of sheet steel, and arranged so it can be quickly placed in position or removed at will. A good method is to let one end swing on a heavy bolt, while the other end is shaped so it will hook over another bolt, which, when tightened, will hold the cover rigid.—Kenneth Coggeshall, Webster Groves, Mo.

Asbestos Hood for a Soldering Iron

An ordinary soldering iron may be carried some distance from the source of heat, and be kept at working temperature for 15 or 20 minutes, if the point is covered with a thick asbestos hood, made from several layers of sheet asbestos.—K. M. Anderson, Temple, Texas.

A Substantial Flagpole

A neat, substantial flagstaff is made of 12 ft. of 2-in. galvanized-iron pipe, a 2-in. to 1¼-in. reducer, 8 ft. of 1¼-in. pipe, a 1¼-in. to ¾-in. reducer, 6 ft. of ¾-in. pipe, and a ¾-in. cap, put together in the order named. Through the center of the cap a ¼-in. hole is drilled for the bolt which holds the small galvanized pulley to the top of the pole. A galvanized hook for the rope is clamped to the pole, 6 ft. from the lower end, with a strap of galvanized iron. A ⅜-in. rope of the best quality should be threaded through the pulley. The staff is set upon a rock in the bottom of a hole, 2½ ft. deep and 2 ft. in diameter, and is braced temporarily. Around it is poured a rather wet mixture of 1 part cement, 2 parts clean river sand, and 3 parts crushed rock. This should be rounded up above the surface of the ground. When the base has set firmly, the braces may be removed.



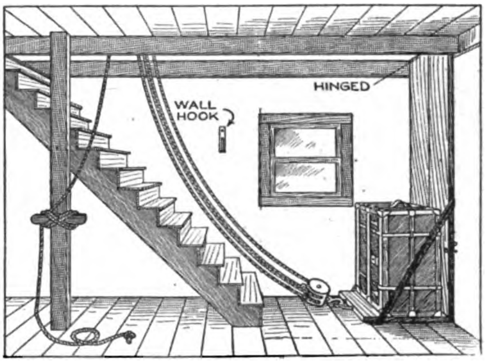
A Flagpole Made of Iron Pipe and Fittings, and Set in Concrete, Is Durable in Construction and Graceful in Appearance

A Swinging Elevator for Trunks and Light Freight

A peculiar form of hand-power elevator, consisting of a hinged platform used in connection with a rope and tackle, will be found useful in homes where trunks are stored in the attic, and in many small shops where freight has to be moved by hand from one story to another.

The elevator is best built in connection with a stairway, although this is not a necessary feature. The platform proper is made of 2-in. material, or lengths of 1-in. lumber very strongly braced. At one end, it is attached with good strong hinges, as shown, while at the other end an end board is placed, large enough so that, when it is swung down into the lower position, a trunk or box may be raised onto it and will rest there securely. If this end board is braced on both sides, as shown, it will be necessary to detach the pulley block when loading on the freight. This is the preferable method, as it is very little trouble to detach the block, and the braces on both sides add much to the strength of the elevator. It may be desirable to leave off one of the braces, since the freight can then be loaded from the side without detaching the pulley block. The upper pulley may be fastened to the ceiling joists, or rafters, of the floor above. If sufficient power is not obtained by pulling the rope with the hands, it is, of course, possible to provide a windlass, or other means of increasing the pull, but this will not be necessary for trunks and like objects.

If the elevator is only to be used occasionally, it is entirely possible to leave it in the upper position so that its floor forms a part of the second-story floor. The rope end can also be carried up the stairway and fastened on a hook above, so that no part of the elevator is in evidence on the lower floor. For places where the elevator would be in more frequent use, it would be well to provide a hook, such as the one shown, on the wall, where the end-pulley block can be hung, out of the way but easily attached to the elevator in a few seconds.

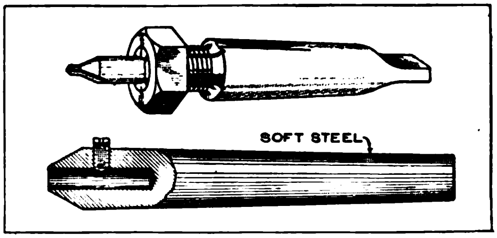


Trunks are Lifted to the Upper Floor by Placing Them on the Swinging Platform and Pulling on the Rope

This type of elevator is not adapted for freight which must be kept standing upright, but this will not be found to interfere seriously with its usefulness.—C. H. Patterson, Portland, Ore.

Countersinking Center Drills Held in Special Chucks

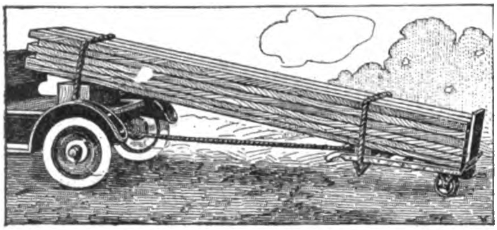
Combination countersink and center drills are in general use in machine shops, but many shops have inadequate means of holding them. The sketch shows two forms of chuck which are readily made for this purpose. The lower one is turned from a bar of machine steel, and has merely a hole in the end, with a setscrew for holding the drill. The taper of the chuck is made to fit the tailstock of the lathe. The upper sketch shows a chuck made from a worn-out ¾-in. twist drill. The end is turned down and threaded with a taper thread. A ¼-in. pipe thread was used on this chuck, and a nut was then tapped out with a standard ¼-in. pipe tap. Slots were sawed in the threaded portion, making spring jaws, a hole being drilled in the end, of the right size for the center drills used. The piece of twist drill should be retempered after it is cut to this shape, and the nut should be casehardened, or, if convenient, a nut may be made from carbon steel and tempered. —M. L. Lowrey, Livermore, Calif.



Two Handy Forms of Chuck, Readily Made, to Take the Combination Countersink and Center Drills Which have Proved So Popular

Load of Lumber Hauled by Light Car and Hand Truck

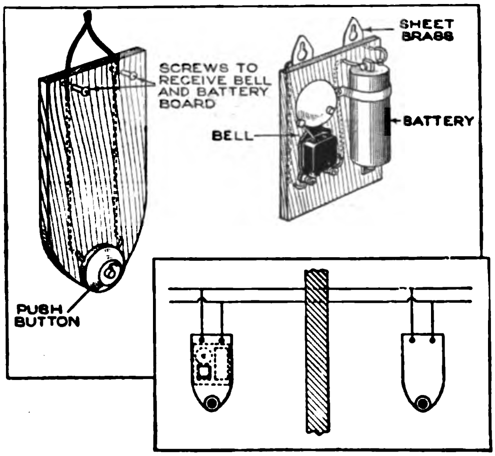
A load of 20-ft. lumber was to be removed, and no wagon or truck of the necessary length was available. The illustration shows how the job was done with a light automobile and a hand truck borrowed from a grocery. The rope from the rear axle of the car to the hand truck pulled the load, while the rope around the rear end of the lumber held the truck off the ground.—Edwin L. Camp, Huntington Park, Calif.



How a Light Automobile and a Hand Truck were Made to Do the Work of a Long Wagon in Hauling a Load of Lumber

Emergency Call-Bell System Has Permanent Wiring

When a person is taken sick in one room of a house, and must have means of calling for assistance from a person in another room, an electric-bell signaling system always is desirable. In time of sickness, however, there is likely to be small opportunity to rig up such a system, and its absence may cause real distress.



A Call-Bell System Which Meets Emergencies without Delay: Each Room Has a Push Button Permanently Installed, and the Bell can be Carried to Any Room Desired and at Once Placed in Service

An effective way to be prepared for this condition, at no great expense, is to install in each bedroom, within easy access of the bed, a push button, mounted on a block, as shown in the sketch. These buttons are connected, in parallel, to a pair of wires which connect all the different rooms. At the top of the block are two screws, each of which is connected to one side of the wiring system. One or more bell boards, such as shown in the upper right-hand corner, are then made, so that they can be hung on the two screws in any room where the bell may be desired. The bell is mounted in series with one or two dry cells on this board, and the wires run underneath the board to the two sheet-brass lugs, which serve the double purpose of supporting the board on the screws and of conducting current into the wires. The weight of the bell board will be sufficient to give a firm contact, if the two lugs are set a good distance apart, and the weight on the board is fairly well balanced.

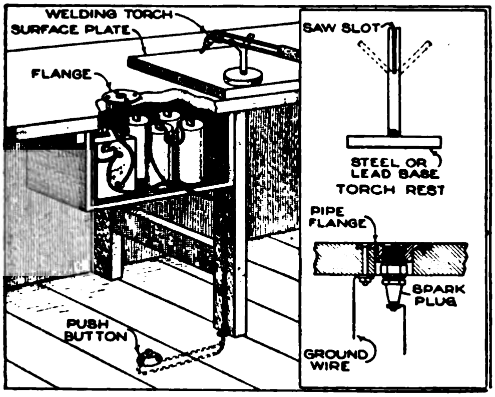
Should sickness occur in any room, it is then only necessary to see that the patient is within reach of the push button, and to hang the bell board in whatever room the nurse or attendant will be. Two or more boards can be used, the same push button then sounding the bells wherever they are placed. If the attendant's work calls her to another room, she can lift the bell board from the screws, take it with her to the other room, and hang it above the push button there. In rooms where use may at some time be found for one of the bells, but which are never used as bedrooms, it is not necessary to install buttons, but merely the two screws the proper distance apart, connected to the two wires which run from room to room.

In an ordinary call-bell system, the addition of extra bells to be sounded simultaneously means extra strain on the batteries, which they may not be able to stand. With this system of wiring, each bell has its own battery, so that any number of them can be hung up in different places and operated by any one of the push buttons without any extra load on the batteries. The bell board may be rigged as shown, or, if a louder alarm is wanted, two cells may be used, one on each side of the bell, in order to balance the weight properly. In times when there is no sickness, the call system may be put to various other uses, and in any case, at least one bell board should at all times be kept on hand, with a battery mounted on it, which is in serviceable condition.—H. E. Gifford, Medford, Mass.

Lighter for the Gas Torch Made from a Spark Plug

It is the practice in some shops to leave a welding torch burning with a small flame when it is not in use, owing to the time required for lighting it. Aside from the danger of fire caused by this custom, it always wastes more or less gas, which is not necessary if some apparatus such as that shown in the sketch is provided. Underneath the bench, in a box mounted for the purpose, are placed four or five dry cells, connected in the usual way to a jump-spark coil, such as used on automobiles or stationary gas engines. The high-tension terminals of the spark coil are connected to a spark plug, mounted as shown in the detail, so that the points are flush with the bench. In the primary circuit is connected a push button, which may be located on the floor, preferably sunk into it, so as to project no farther than the necessary distance for pushing the button with the foot. The torch is lighted by turning on the gas and bringing the nozzle near the spark plug, at the same time pressing the button with the foot. The time required for this operation is practically none, after the workman has become familiar with the location of the button and spark plug. In the upper right-hand corner of the sketch is shown a simple method of making a stand or rack for the torch, which will be handy in connection with the lighting apparatus.

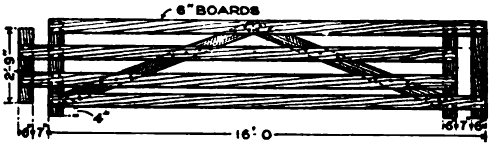
While the gas saved is perhaps a small item, the element of safety is more important, and since the amount of current used is very small, the apparatus will be advantageous in many shops where the all-around usefulness of a welding torch is appreciated.—C. C. Spreen, Detroit, Michigan.



A Spark Plug, Sunk in the Bench, and Connected to a Coil and Battery of Dry Cells, Eliminates the Necessity of Leaving the Torch Burning

Portable Fence Formed of Easily Detached Sections

Modern methods of raising live stock on the cafeteria plan require the use of a succession of pasture crops, planted in rotation to mature at just the time when they give the greatest food value, and in the amounts best calculated to furnish the necessary feed without waste. To use the plan with the greatest success it is necessary to confine the stock to the feeding ground ready at the time, so that they will not injure or waste the growing crops. Since it is not practical to cut a farm permanently into small fields, some system of portable fences must be used.



Universal Panel with Interlocking Ends Builds Portable Fence to Confine Stock to Small Feed Areas

Such a fence is set up very quickly by using a universal panel which may be put together in either of two ways, and which may be made of any size desired. The panels are built of boards, 6 in. wide and 1 in. thick. At one end of each panel a space is left into which an interlocking end of a similar panel will fit. The panels are made rigid with an inverted-V brace. The fence may be set up with the interlocking members forming a sort of zigzag, in which case the fence needs no other support; or, if so desired, the panels may be placed in a straight line, when it will be necessary to drive stakes on each side of the interlocking joints.—Herbert A. Shearer, Chicago, Ill.

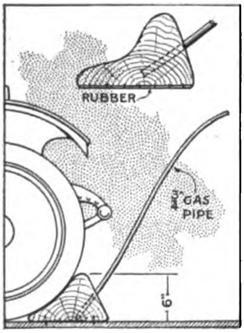
Rubber Cement for Repairing Tire Valve

A bicycle rider found himself 15 miles from the nearest village, with a fast-leaking tire valve, due to the rubber washer being worn out. Remembering that he had some rubber cement in a tube, he applied a small quantity of it to the worn washer, and after letting it dry, inserted it again in the valve stem. It served the purpose perfectly until a new valve stem could be obtained.—Raymond Lister, Winnipeg, Manitoba, Can.

Headrest for Auto Mechanic Strapped to His Head

An automobile mechanic who had experimented with various devices to rest his head upon, while working underneath a car, found that they were all liable to the objection that, when moving around, it was difficult to move them and get them in the right place without losing considerable time. He then made a pad consisting of a block of wood lined with felt, to fit the back of his head, and provided it with a piece of tape which was tied around his forehead. He could thus move around under the car without worry as to whether his head would come down in a puddle of grease on the floor. Should the headrest come in contact with such a puddle, no other precaution is necessary than to slip it off the head before standing erect.—Glenn Bron, Salt Lake City, Utah.

The Auto Stop Block Reduced to Efficiency



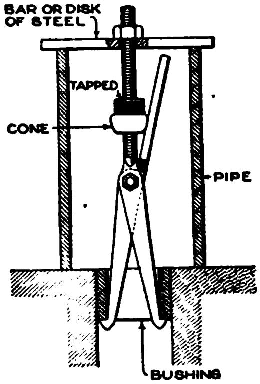
To keep cars in place on the floor of the garage, the usual method is to set a block of wood against the tire, kicking it into place with the foot, which is a very easy and effective process. The trouble comes in removing the block, if it is tightly wedged in. To overcome this difficulty, a large eastern garage uses specially shaped blocks, fitted with pieces of gas pipe for handles. The blocks can thus be removed in less time, and quite easily.—P. P. Avery, Garfield, N. J.

ℭRepair gums and tire fabrics received in cold weather sometimes appear lifeless when they are merely frozen. Thaw out the material in a warm room before using it.

Spring-Opening Lock Fitted on Ruling Pen

A small, stiff piece of spring steel, drilled to fit under the thumbscrew on an ordinary ruling pen, converts it into a spring-lock instrument. A curve on one end holds the blades together when the metal is turned the long way of the blade, while the other end is made long, to serve as a lever for unlocking. This is done by swinging the lever to one side, thus releasing the spring of the pen, and allowing the blades to open for inking; swinging it back brings the blades together again. Pens thus equipped give service equal to that of high-priced instruments.—Elmer O. Tetzlaff, Cicero, Ill.

An Adjustable Bushing Puller



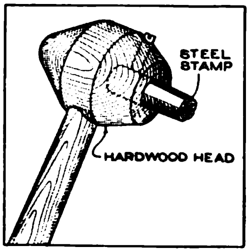
Removing tight bushings is a subject which has engaged the ingenuity of many a mechanic. The device here illustrated may often enable one to extract, without damage, a bushing which would otherwise have to be cut in two in order to remove it. The materials necessary are a short piece of pipe, a steel bar, or disk, across the top, two pieces of steel rod, and two nuts. Both pieces of rod should be forged at the lower end to the shape shown; at the upper end one piece is threaded and the other is left smooth. They are riveted or bolted together, somewhat like a pair of heavy inside calipers. The piece of pipe should be cut out at one side to give access to the cone nut with the fingers. After it is tightened, the bushing is pulled up by turning the upper nut with a wrench.

Draftsman's Triangle with Raised Points or Feet

A draftsman's triangle, of wood or composition material, may be fitted with three brass plugs, or rivets, located near the three corners of the triangle, riveted over to form similar heads on both sides. These will give two advantages in use. The tendency of the ruling pen to blur the line when the ink comes in contact with the triangle will be eliminated, and the triangle will be much easier to lift from the table, as there will be sufficient space under it to insert the finger nail. Triangles fitted up in this way will save much time for the draftsman and tracer.—G. A. Luers, Washington, D. C.

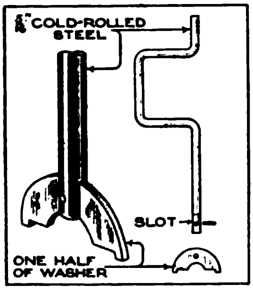
Inspector's Stamp Built into Hammer

Stamping of wood, or soft-metal, parts, such as might be required after inspection, is most quickly accomplished by constructing a stamping hammer, as shown in the sketch. A wooden head and handle are formed out of pieces of fairly hard, heavy wood, and a socket is cut in the head so that the metal stamp can be driven in securely. To stamp an article, simply strike a blow with the tool, instead of using the stamp with a hammer. Such a device is of use in stamping either inspection marks, figures, or letters required in processes of manufacture.



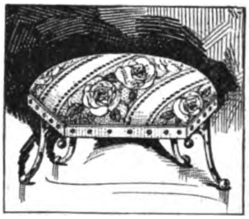
Valve Grinder Made from Washer

A valve-grinding tool such as this will be found very handy for valves which are provided with two holes for gripping them while grinding, rather than with a slot. The shank may be held in a bit brace, or it may be made longer and bent to the shape indicated, so as to be used like a bit brace itself. A heavy iron washer of the proper size is cut in half and filed so as to leave the two lugs projecting the proper distance apart to fit the holes in the valve. The shank is then pinned to the center of this semicircular piece, and the tool is ready for use. It will be seen that the tool has the advantage of equalizing the pressure on all sides of the valve, which greatly assists the formation of a good fit all around the valve seat.—J. E. Barkley, Detroit, Mich.



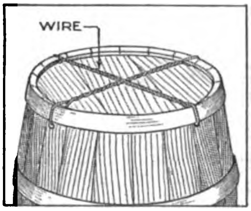
Footstool Made from Harness Hooks

A novel and pretty footstool may be made from a board, about 12 in. square; four harness hooks, 6 in. long or over, and a piece of brocaded velvet, or leather, for covering. Saw off the corners of the board, being sure to get the sides of equal length, thus making an octagon. Screw the four harness hooks under the stool where the corners were cut off. Pad the top of the stool, and cover it with the brocaded velvet or leather. Turn the edges of the covering material under at the lower edge, and fasten with tacks, completing the stool.—Mrs. Grace E. Willey, Concord, N. H.



Wires across Barrel Heads Give Protection

A concern which every year ships many tons of iron castings in barrels had trouble from the heads of the barrels being knocked out. It was found to help a great deal in preventing this to fix across the end of the edge of the barrel heads stout steel wires, twisted together, as shown in the sketch. Four holes were drilled under the first hoop; the wire was passed from one hole to the opposite one, doubled back, firmly twisted, and spliced. The crossing wire was put in in the same way. The barrels held together during long trips and much rough handling.—Irl R. Hicks, Centralia, Mo.

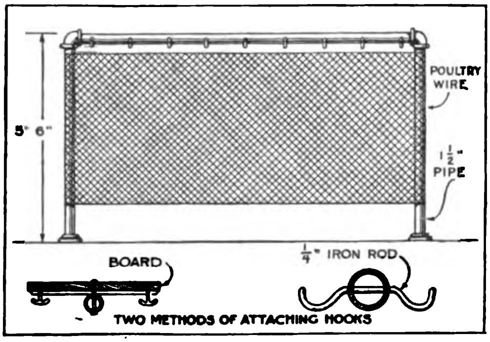


Reaming Large Holes with an Ordinary Twist Drill

Large holes that must be still further enlarged can easily be reamed with a twist drill, when the desired size of reamer cannot be had. By procuring round oak plugs, turned to a driving fit, and driving these plugs into the hole to be reamed, the drill will be less likely to bind and wobble, and therefore less liable to breakage than when trying to drill the holes without the plugs.

An All-Metal Coat Rack

A clothes rack for the shop, which is very strong and durable and free from dirt-catching corners, is made as shown in the sketch. On a frame, consisting of three pieces of 1½-in. pipe screwed into flanges on the floor, is hung a length of poultry-wire netting to separate the garments hung on one side of the rack from those hung on the other. To the horizontal pipe are attached the hooks, which may be arranged in any of several different ways. The arrangement in the lower right-hand corner is simple, the hook consisting merely of a piece of ¼-in. iron rod, driven through a hole drilled in the pipe, and bent into shape with a hammer and round anvil. The hook arrangement in the left-hand corner gives greater capacity to the rack, but is slightly more expensive. With either of these types of hooks, it is advisable to put a pin through the elbow at one end of the horizontal pipe, so as to keep it from turning, in case one side should be overloaded with heavy clothes.



A Stout Sanitary Coat Rack is Readily Made in a Few Minutes from Three Pieces of Pipe, Some Wire Netting, and Scraps of Iron Rod

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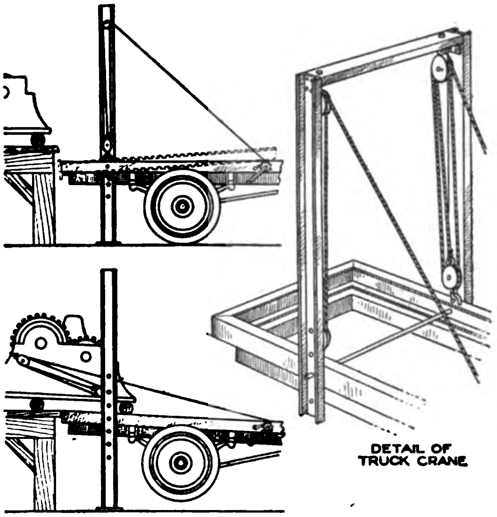
Crane at Rear of Truck Helps Load and Unload

For a truck man, or anyone engaged in general hauling, the idea of a crane built onto the back end of a truck presents great possibilities in the way of cutting down the time and number of men required for heavy jobs of loading and unloading. The frame of the crane may consist of two pieces of channel steel, long enough to reach from the ground up over the top of any load which may be expected to be carried on the truck; a shorter channel across the top of the two uprights, and a piece of flat sheet steel for the bottom. The first use of the crane, shown in the upper left-hand corner of the sketch, is to raise the rear end of the truck from the ground up to the height of the loading platform, whenever this is necessary. For this purpose, the pulley blocks, two at each side, are arranged as shown, and turning the crank at the right raises the truck to any height desired. Before this is attempted, the front wheels must be securely blocked, front and rear, since, with the rear wheels off the ground, the brakes on an ordinary truck are of no use.

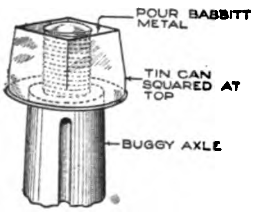
After the truck is in position, it may be held there either by the rope, and the pawl acting against the ratchet, or by putting a pin across through the crane and the frame members. If it is held in the latter way, the upper pulley blocks can then be detached from the top of the crane, and the same tackle can be used to pull the load on or off of the truck, as shown in the lower sketch. Finally, after the job of loading or unloading is done, the upper pulley block may be shifted down to a hook on the bottom plate of the crane, and it can then be raised by turning the crank high enough so that the pin can be placed through the frame members, thus attaching the crane firmly to the truck for carrying. It is then swung down to the position shown dotted in the upper sketch, where it rests securely during the haul, or until it is next required. At the right, the crane is shown in greater detail, and suggested



A Crane Attached to the Rear of the Truck Often Enables Two Men to Do with Ease What might Otherwise Be Slow and Difficult for Three or Four means of attachment are indicated; these will, of course, vary for different types of trucks. If the U-bolt illustrated is used for attaching the lower pulley blocks to the crane, it will be advisable to attach a similar U-bolt to the middle of the bottom plate of the crane, in order that the frame members may not interfere with the pulley blocks when the tackle is arranged for raising the crane to the carrying position. Dimensions and strengths of the various parts will have to be worked out for each case separately, as they depend on the size, weight, and character of the truck, and the nature of the loads expected.—F. F. Burnstead, Long Beach, Calif.

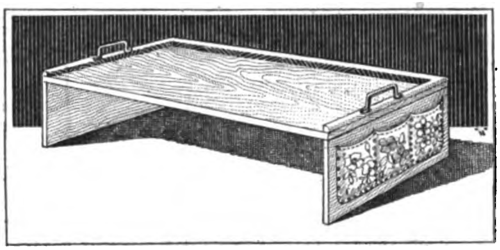
Emergency Nut Cast of Babbitt

When a nut, especially a large one of a certain size, must be had for repair work, and is not to be found, a good way is to make one from babbitt. In the case illustrated, a portion of a tin can was bent up to a shape approximating that of the nut desired. A hole was made to fit the thread of the axle, and the can was set in place to form a mold. After greasing the threads and the mold with an oily rag, babbitt metal was poured into the mold. When cool, the tin is torn away and a nut remains, which, if it has not the strength of a steel nut, will often give good service. The process is especially useful when a nut with a left-hand thread is required, as left-hand taps of the required size are less likely to be found handy than right-hand taps, while the babbitt nut can be used in either case.—W. J. Mahnke, Coeur d'Alene, Idaho.



Invalid's Table Rests on Bed

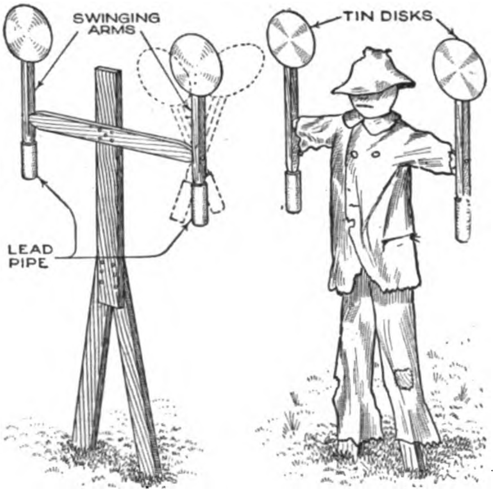
For the invalid who is able to sit up in bed, a great convenience is a table, or tray, made somewhat shorter than the width of the bed, with supports, 8 or 10 in. high, at either end, so that it can be set upon the bed directly over and in front of the patient. Three sides of the top are furnished with a narrow molding, and small brass handles attached at the ends. The wood may be stained and ornamental pockets made on its ends. These end pieces can be fastened to the top with nails or screws directly, and some form of blocks or braces should be used underneath to strengthen the joints.—Mrs. G. E. Wilson, Boston, Mass.



A Tray of This Type, Which Extends across the Patient's Knees, will Often be Found Handier Than Those Ordinarily Used in Hospitals

A Scarecrow with Moving Hands

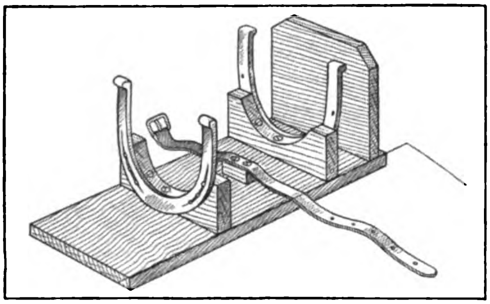
A scarecrow which, if not very lifelike, proved effective in frightening away the birds, was provided with "arms" to be revolved by the wind. On the ends of the crossbar were mounted two sticks of pine, 1 in. square. To one end of these sticks were fastened disks of bright tin, 7 in. in diameter; the other end was rounded off, and a piece of iron or lead pipe was driven on as a weight. The holes through these arms were placed at the points found by balancing the arms after the disks and pipe weights were applied; thus the slightest breeze would cause them to revolve. They will move somewhat more freely if washers are placed between them and the crossbar.—Sylvanus Van Aken, Port Ewen, N. Y.



The Scarecrow Waves Its Arms with Great Rapidity Whenever a Slight Wind Blows, and Is Very Efficient in Keeping Away the Predatory Birds

An Asparagus Buncher

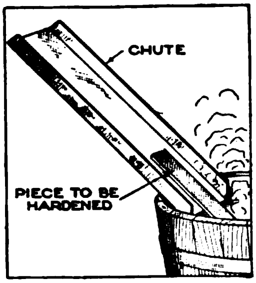
A handy rack for bunching and tying up asparagus, rhubarb, and similar garden produce, is made from two horseshoes, mounted on blocks of wood. The base should be about 8 in. wide and 13 in. long. A block, about as high as the horseshoe, should be used as a headboard. The horseshoes are nailed to two blocks, sawed out as shown, and a leather strap, tacked to the baseboard, will serve to hold the bunch while it is being tied. The ends of the horseshoes should be set out somewhat with a hammer before mounting, so as not to bend inward at the top. String cut to the right length is placed on the board before starting work.



Vegetables, Such as Asparagus, are Laid in This Rack, Made from Horseshoes, and are Held with a Leather Strap While being Tied for Market

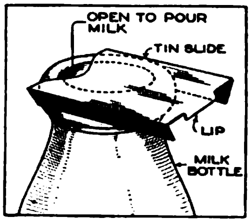
Hardening Long, Thin Pieces without Warping

It is difficult to harden a long, thin piece of steel without considerable warping. This is due to the cooling of different parts at different times, producing internal strains. If the red-hot piece is allowed to slide into the liquid on a chute held at an angle of about 45°, it will strike the water, end foremost, and cut into it at once. This gives better results than dropping it directly from the tongs, as the latter allows it to tilt, which will keep it from cutting in sharply and delay the contact of the liquid with some parts of the surface, thus causing warping. The chute may be a piece of scrap iron or tin, about 2 ft. long, bent up on two sides as shown.



A Milk-Bottle Cover

The thin tin boxes in which some kinds of fancy crackers are packed may be easily cut by scissors to make an excellent milk-bottle cover. Cut a strip a little wider than the top of the bottle, so that both sides may be bent down to engage the neck of the bottle, the tin being bent inward on an angle a little less than that of the wall of the lip. In cutting the ends of the tin, leave a lip or point on one end, to be bent down, and make an inward curve on the other end, to permit an opening to be made without removing the cover from the bottle.

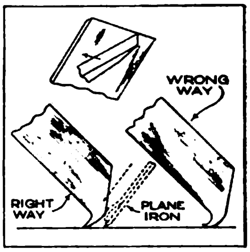


Magnetic Locator Useful in Wiring Finished Houses

A simple method of locating positions for openings in wiring old houses is that of using an ordinary magnetic compass, and a large, magnetized file. The file, which should be strongly magnetized, is driven into the ceiling at the point where it is desired to bore the hole. By moving the magnetic needle over the flooring above, it is possible to locate the desired position by the agitation of the compass needle.—Peter J. M. Clute, Schenectady, New York.

Good and Bad Scraper Edges

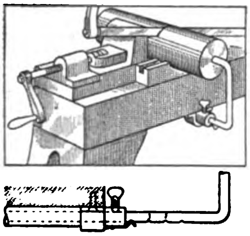
A great many carpenters have constant trouble in putting a good working edge on a scraper. This difficulty is almost always due to the curling of the honed edge while "turning" it, or, to use an inappropriate though widely employed term, "rolling" it. While it is quite difficult to learn to turn the edge of a scraper, anyone can easily rectify a poorly turned edge by straightening out the portion that has curled.



This is easily accomplished by running the sharp edge of a chisel along the inside of the turned edge of the scraper. To do this, the chisel must be held at a very acute angle to the surface of the scraper blade, and at an angle of about 45° to the turned edge, holding the under, or flat, side of the chisel up and going along the edge lightly and without the use of any force. The sharp, honed, and perfectly straight edge of the chisel takes hold of the finest curled scraper edge. The angle used in the operation is very similar to that at which a plane iron is honed and set in the plane. The same scraper edge can be brought back to good working condition repeatedly by employing this process, which not only rectifies the edge, but also removes from it particles of wood, dust, and glue.—Henry Simon, Laguna Beach, Calif.

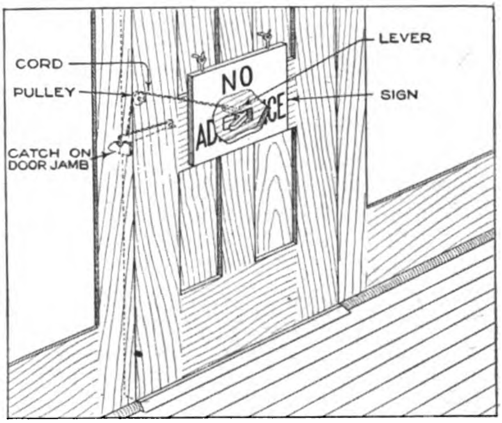
Measuring Gauge for Power Hacksaw

The ordinary forms of power hacksaw are not provided with gauges for determining the length of the pieces to be sawed, and the usual method is to measure the length required with a scale, and set the piece in the vise so that the saw comes at the proper point. In order that the hacksaw may be provided with its own measuring scale, a gauge like the one illustrated can be readily built onto almost any power hacksaw. A piece of thick tubing is held in metal strips, screwed under the frame of the machine, and a setscrew, of a form easily turned with the fingers, is threaded into this tube. For strength and durability, it is well to reinforce the tube at the point where the setscrew comes by driving on it, or soldering around it, a piece of larger tubing, or an iron strap, so that the screw will have a longer thread to work against. Inside of this tube slides a piece of round iron rod, which is bent to a U-shape, as shown. Upon it may be marked graduations to indicate directly the length of the pieces to be sawed off from the stock. It will also be found useful in many shops to add a spring and some notches in the rod, at a distance from each other of 1 or ½ in., so that the gauge may be easily set to these frequently used points.—C. Anderson, Worcester, Mass.



Door Latch Operated by Sign Reading "No Admittance"

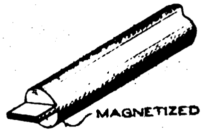
A factory made use of a novel device on one of its doors, which was intended for the use of employes only, although opening on a semipublic thoroughfare. There was on the outside of the door no knob or latch, and no other visible indication of how to open the door. The latch behind the door was, in fact, worked by a lever and cord, which was operated by pressure at the proper spot on the "No Admittance" sign. This was known to employes, and the secret can readily be discovered by anyone after gaining access, but the method by which the employes opened the door was far from being apparent to bystanders, and did good service in keeping out intruders.—H. F. Blanchard, Portland, Me.



The Door is Provided with a Latch Opened by Pressure on the "No Admittance" Sign, and the Stranger, Seeing No Means of Entrance, Is Forced to Obey the Sign

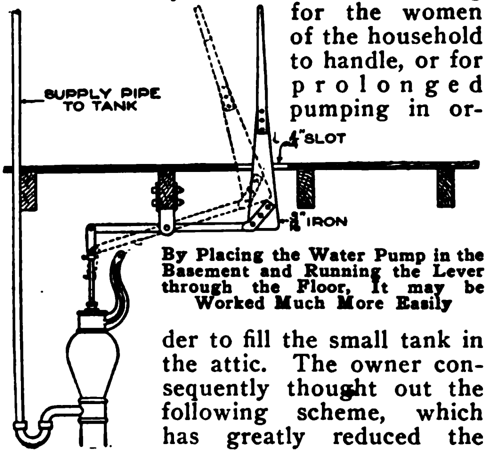
Making a Screwdriver Magnetic

Magnetized screwdrivers are useful for many classes of work, the carbon steel of which screwdrivers are made being capable of retaining considerable magnetism. A screwdriver which will retain a considerably stronger magnetism than an ordinary one, may be made from a round piece of tool steel, or preferably of tungsten steel, by simply grinding the end of a bar into the form of a very short screwdriver blade.—Maurice Clement, Youngstown, Ohio.



Long Lever Eases Action of Force Pump

A vertical force pump of the common kitchen variety was too hard-working for the women of the household to handle, or for prolonged pumping in order to fill the small tank in the attic. The owner consequently thought out the following scheme, which has greatly reduced the labor.



By Placing the Water Pump in the Basement and Running the Lever through the Floor, It may be Worked Much More Easily

The pump was placed under the kitchen floor, as shown, and the blacksmith made a lever from an old axle, somewhat of the shape illustrated. At the left end was placed a link, as in common pump jacks, and to it was fastened the upper end of the pump rod. The other end of the lever was riveted to a piece of sheet iron, and the handle was fastened to it. The lever was pivoted to the underside of a joist by means of an eyeplate and bolt. A slot in the floor allowed the handle to be swung back and forth. This slot was too narrow to permit mice to pass through, or much cold air to enter. Where 50 strokes of the pump was formerly quite tiresome, the operator can now take 500 without undue exertion.

Handy Kitchen Chopping Board

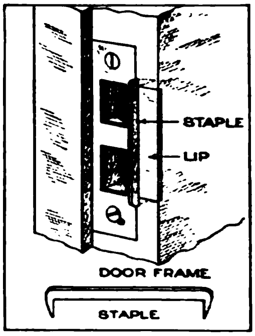
A handy chopping board may be quickly and easily made from a piece of hard wood, a pointed kitchen knife, and a large staple. The staple is driven into the edge of the chopping board far enough to set it firmly and at the same time to allow the point of the knife to fit into it. To operate, the knife is raised and lowered with one hand, while the food is passed under the blade with the other. Use of this device makes it easy to chop, slice, or mince, and there is little danger of the knife slipping, even though great pressure is applied.

Nail Makes Satisfactory Plow-Plane Bit

When cutters of a special size are required for plow planes, a quick and efficient way to make them is to dress down a large nail or spike to the required shape. Although the adjustment of such a cutter will present somewhat greater difficulty than one of the ordinary type, its performance, if it is carefully made and sharpened, will be quite satisfactory for many purposes. Cutters up to ¼ in. wide can be made from 16, 20, and 30-penny spikes.

Staple Prevents Manipulation of Lock

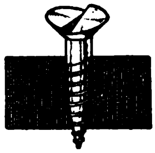
Many doors which have been long in use have shrunk to such an extent that there is quite a space between the door and frame when the door is closed. Manipulation of the locks through this space is quite possible, especially where spring locks are used. An effective method of preventing this is to make a staple of sheet iron, long enough to take, between the two pointed ends, the lip of the striking plate. If this staple is then firmly driven in the position shown, it will be impossible to get at the lock to manipulate it.



Carrying Piano Made Easy by Handles

When a heavy piano is carried upstairs and down and from one place to another, injuries to the instrument and to steps and doorways will usually result. The difficult thing in the transportation of a piano is not in the weight but in the placement of the weight. A carrier which will reduce this difficulty is made easily from two 10-ft. pieces of 2 by 4-in. lumber. These are placed, one at the front of the piano, between the legs, and the other at the back of the instrument. Padding of paper or felt should be placed next to the piano to avoid scratching, and the handles should be bolted together by ½-in. iron bolts at either end. With the ends of the timbers shaved down to suitable size, six, or even four, men can easily move the piano.—William H. Leach, Alden, N. Y.

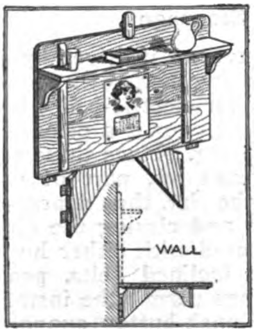
A Nonremovable Wood Screw



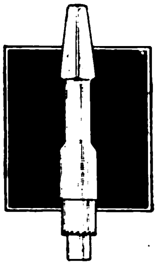
By filing off the head of an ordinary flat-head wood screw, as shown in the sketch, a screw is obtained which can be driven in with an ordinary screwdriver, but cannot be taken out except with great difficulty. While such a screw would be far from desirable in ordinary use, it is just the thing for attaching strap hinges, hasps, etc., where one wishes to make it difficult to interfere with the fastening. In driving ordinary wood screws, if the screw fits tighter than is anticipated, it is sometimes necessary to take it out and ream the hole, or use another screw. As such a procedure is not possible when using this nonremovable screw, it is advisable first to drive home an ordinary screw of the same size, then take it out and drive home the nonremovable screw.—A. B. Nutting, Boston, Mass.

Folding Table Handy in the Kitchen

In a small kitchen, table space is often needed when it is not possible to keep a table of the desired size in the room permanently. A table top of the most useful size may be hinged to the wall, and supported when in use by brackets which also swing from hinges. The table top is held against the wall, and therefore out of the way, when not needed, by a wooden button. A shelf may be fastened to the underside of the table, which will be useful when it is folded up. If the device is well made it will be quite durable, and will not detract from the general appearance of the room.

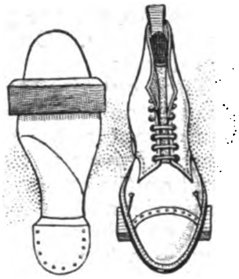


Saw-Tooth Counterbore Useful on Irregular Work



In repairing a broken casting in an almost inaccessible part of a traction engine, it was necessary to drill a number of 5/16-in. holes by hand, and as these holes were through a curved part of the casing, they had to be counterbored, so that the bolt heads would fit squarely. For such cases, the ordinary two-lipped pin drill does not work well when held in a brace. The tool illustrated was therefore made, consisting of a hollow bit with saw teeth filed in the end; after this has been hardened and tempered, the pilot is driven into place within the toothed circle. Such a tool is particularly effective in cutting brass. An objection to it is that it is difficult to sharpen, this being done by pulling out the pilot and sharpening the teeth with a stone, or with a file, if the tool is made of steel which is soft enough to permit this.

Wooden Blocks Keep Shoes Dry on Damp Floor

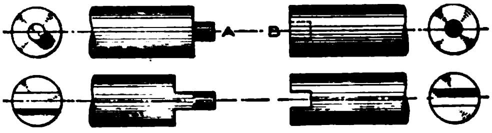


In order to keep his feet off of the floor, when required to work for a considerable time on a damp floor in a basement, a workman nailed strips of wood to his shoes, as illustrated. The result was entirely satisfactory, and his feet remained warm all through the day. The device is lighter than a good pair of overshoes and keeps the dampness out just as effectively, without injuring the ventilation and freedom of the feet. While wider blocks might provide slightly greater comfort, the advantage of the narrow ones is that very little dirt is collected, the feature of greater lightness also being of importance.—W. S. Hutton, Fornfelt, Mo.

ℭA fisherman's sinker made of lead, with a nail set into the bottom, makes a very satisfactory plumb bob.

Making Tongue-and-Groove Joints on Shafting

In making tongue-and-groove joints on shafting, it is difficult to set the milling machine so as to get a very accurate alinement. The job may be made easier by first setting up the two shaft ends in a lathe, turning down a plug, A, on one end, and drilling a hole, B, to fit it on the other end. It is possible to do this work quite accurately. In cutting the piece on the milling machine, the circular work is used for gauging purposes. The groove is cut right through the hole B, and when the tongue is cut to the same thickness as the round plug A, this plug is cut off. This method enables a man of only moderate skill to do a very good job. —S. B. Royal, Reading, Pa.

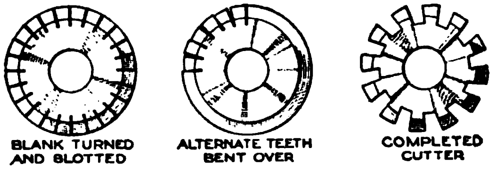


The Work of Making a Tongue-and-Groove Joint on Shafting is Easily Done by First Fitting a Plug into a Central Hole on the Other Shaft

Making a Small Milling Cutter

Making a special, or form, milling cutter, the teeth of which can be readily sharpened without modifying the form of the slot cut by the tool, is quite a trick in the home workshop, especially if one wishes to get the proper clearance angle on the teeth. One way of doing this is as follows:

Turn out the blank from carefully annealed tool steel, and saw a number of equidistant radial slots, making twice as many of these as the number of teeth desired on the cutter. These slots should be cut in the milling machine with a standard saw, or thin cutter, and should be of the same depth, within a few thousandths of an inch. Now, with an old table-knife blade, or a piece of spring steel that will fit into these slots, bend every alternate tooth back until it touches the next tooth. Then harden the cutter, put it in a vise, and with a punch or nail set, knock out all the teeth that were not bent. The cutter is then ready for tempering to a straw color, and after this, for immediate use. Such a cutter may be sharpened exactly like a regular factory-made cutter. Somewhat better-shaped teeth will be produced if the slots are not quite radial, slanting backward just enough so that they will be radial after the teeth are bent. The exact placing of the slots depends on the material to be milled.—S. A. Asquith, Waterloo, Iowa.



BLANK TURNED AND SLOTTED

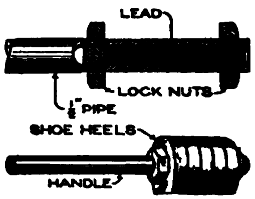
ALTERNATE TEETH BENT OVER

COMPLETED CUTTER

Bending Back the Teeth before Hardening, and Breaking Out the Intervening Pieces before Tempering, Provide a Milling Cutter with Good Clearance

Substitute for Rawhide Maul Made from Shoe Heels

In view of the present high price of rawhide mallets, the kink illustrated may be of use to many machinists. A number of heels from old shoes are collected, the outer layers trimmed off if necessary, and a hole is drilled through them, large enough for a piece of ½-in. pipe. The end of the pipe is threaded in the lathe for a sufficient distance, and the pieces of leather are held clamped between two nuts. A hammer thus made will not be heavy enough for most purposes unless lead is poured into the end of the pipe, but with this addition, the mallet, although less durable than a rawhide mallet, will serve well enough at a much lower cost.



Electric Alarm Warns of Belt Stoppage

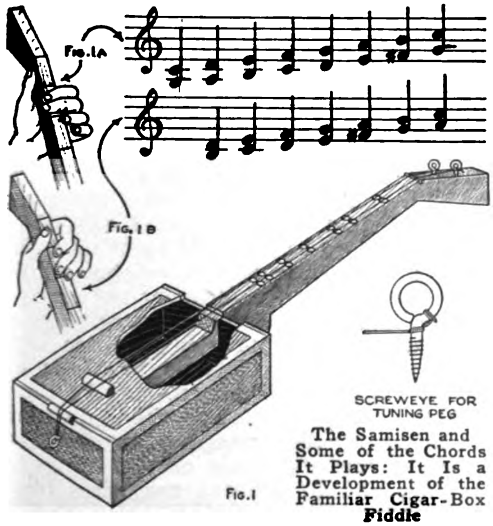
A jackshaft or conveyor, if driven by a belt, may give a warning of its own stoppage by the use of an electric-bell wire with push button, and over it a piece of slat, held up by a spring. Place these so that if the belt comes off, part of its weight comes onto the slat, thus depressing the push button and closing the circuit. This may be used with either horizontal, vertical, or inclined belts, provided the surroundings permit the installation of wires and push-button support at suitable points. More than one bell may be wired up, each with its own circuit and its own push button beneath the slat, or several buttons may be connected through the signal lights to the same bell. —J. E. McCormack, Haliburton, Ont.

Homemade Stringed Orchestra Instruments

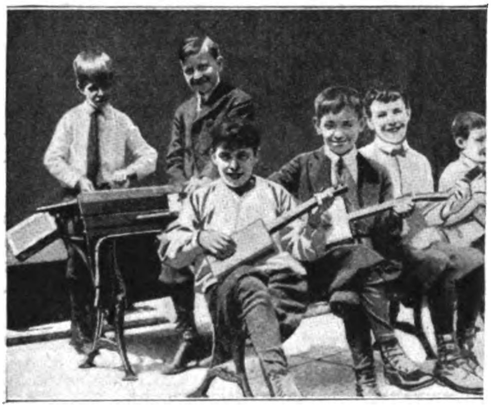
By FRANK M. RICH

An instrument which is similar to the samisen of the Japanese can be made of a cigar box, or other box of thin wood, a narrow board of 1-in. stock, some thumb tacks and screw eyes, and some fine piano or mandolin wire. The tools required are a plane, saw, jackknife, and something to start the holes for the screw eyes. A little glue will also be needed.

Saw the board for the neck piece as shown in Fig. 1. The lower part of this board is fitted inside the box; notice that this portion is cut away so that it touches the box at only two points. This is done to allow the head to vibrate as much as possible, and so produce a loud, full tone. A little care will be necessary in order to get a good fit everywhere. Be sure to make proper allowance for the thickness of the box. A square hole is cut in one end of the box, the neck piece inserted, and one end fastened with a screw eye, which also serves as a tailpiece to which the strings are fastened; one of the cigar-box nails is driven through the head of the instrument into the neck piece, over the place where the hole was cut, to make everything firm and tight. If the neck piece is fitted quite accurately into the box, the results will be more satisfactory.



The Samisen and Some of the Chords It Plays: It Is a Development of the Familiar Cigar-Box Fiddle



A Few of These Homemade Instruments will Furnish Amusement for a Long Time to a Group of Boys or Girls

The bridges, one on the box and one at the bend in the neck piece, should be whittled from hard wood, notched to keep the strings about ¾ in. apart. The depth of the notch in the little bridge (the one on the neck of the instrument) should be only a trifle higher than the frets, otherwise the strings will be stretched too much in playing the first fret, requiring the frets, especially the first, to be placed out of position, or else making the tuning of the instrument very bad. The big bridge is somewhat higher so that the string will not strike the second fret when the first is used; otherwise the tone will be "rusty." The same effect is produced unless the slots in both bridges are cut lower on the side next to the screw eye, so that the vibrating portion of the string meets a sharp edge, and therefore does not buzz against the wood. The finger board should be planed and sandpapered into perfect line; the back rounded; the bridges attached with glue; the two upper screw eyes inserted far enough from the bridge so that the strings will be sure to touch it, and the strings attached as shown in the diagram. The frets are made by inserting thumb tacks at the points found to be the correct ones. Place the tacks in not quite straight, so that the string will be sure to touch the tack firmly at the edge next to its vibrating portion. This is to prevent rusty tones, as referred to above.

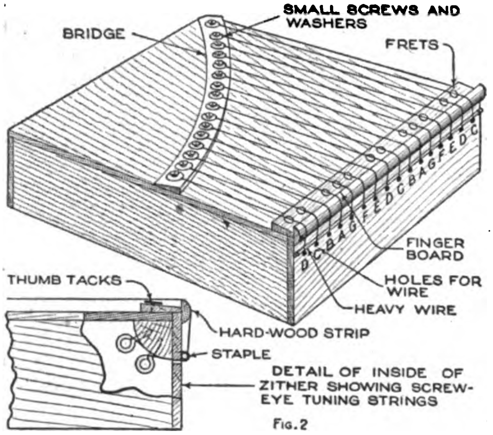


Fig. 2

The One-Fret Zither, is Made of a Somewhat Larger Box, and can be Played in All Keys

When played, the instrument is held in the lap, fingered with the left hand, and plucked with the thumb and first finger of the right. The farther string should be tuned to C, the nearer to G below it; or to some other two notes having the same interval so that they sound "do-sol."

The frets are placed so that, if the tone sounded by either string when open is called "do," the frets will give the notes of the scale, re, mi, fa, etc., up to the next "do," or even farther. The other string will then also give tones which make up a similar scale. Putting one finger across both strings, upon the same fret, gives the fourths, as seen in Fig. 1A, and the staff beside it. By placing the first finger on the outside string, first fret, and the second on the inside string, second fret, as in Fig. 1B, the thirds can be played.

These easy positions, in addition to the G string played open with the various frets of the C string, enable one to carry a very plausible alto part with no difficult fingering. The tacks used for frets are placed on the same level for both strings. This gives F sharp instead of F on the G string, and thus enables one to play minor passages on the G string corresponding to those played before on the C string. Easy modulations are taken care of quite well. Where a piano or other instrument is used for accompaniment, pieces in several different keys can be played by tuning the samisen to those keys.

The zither, Fig. 2, can be made of a box of thin wood of any size. The sound harmonizes well with that of the samisen, and a few of them, large and small, mixed in with the samisens, make a welcome addition to the orchestra of homemade instruments. The zither plays in any key, by pressing down the strings on the frets wherever the key calls for sharps and flats.

Since the strings should be nearly of the same tension, and as it may not be practical to get different sizes of wire, it is necessary to pay some attention to the length of the strings. The eighth string will be half the length of the first, and the fifteenth, two octaves above the first, will be one-fourth. The ends of the intervening strings will lie in a curve between. The curve need not be exactly correct, as the error in length of strings can be made up for by pulling some of these a little tighter than others. Lay off the curve on paper, then whittle, saw, or file out a hardwood bridge of the right size and shape, so that the ends of all the strings can be fastened to it by means of small round-head screws with small washers to match. This bridge will need to be beveled back a little, so that the vibrating portion of the string ends against a sharp edge, and therefore cannot buzz. The screws should be just long enough to go through the bridge and well into the wood without reaching the inside of the box. A little glue put on the bottom of the bridge, when the screws are inserted, will strengthen the fastening. Holes should be started with an awl or small drill, so as to avoid splitting. The wire is made into a loop, twisted a little for security, then held under the screw.

The finger board is a narrow strip of thin wood, either beveled to serve as a bridge, or having a strip of wood or metal for a bridge inserted at the edge. Another strip is glued to the end of the box, where the strings pass over the edge, to ease the strain on the strings in tuning, and to prevent the wires from cutting into the edge of the box. A piece piece of heavy wire, tacked along the end of the box, will serve the purpose.

Thumb tacks serve as frets, and are placed on the finger board, under C, D, F, G, and A, one-sixteenth of the length of the string from the end bridge, to give the half-step notes, or the notes that are played by black keys on the piano. The screw eyes, used for tuning the strings, are set in a piece of quarter-round wood, glued inside the box, under the finger board. These tuning keys are placed in two lines for convenience, as they would otherwise be too crowded. The wires pass from the bridge to the screw eyes through small holes in the end of the box.

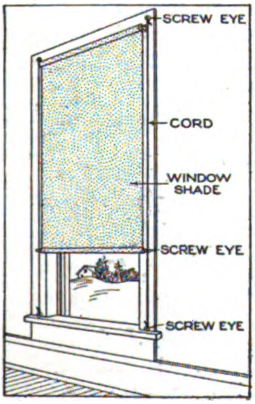
The zither is especially valuable to the student, as it plays in any key readily, and gives chords of two and three notes with pleasing effect. The fingering will be easily acquired, as there is only one fret to a string.

Drying Negatives and Prints Quickly

A photographic print can be dried quickly by artificial heat, but this method usually results in rolling up the films, which makes them inconvenient to handle. A method which is not open to this objection is to immerse the print in alcohol until it is saturated, and then allow the alcohol to evaporate. A glass negative can be dried in this way very quickly, and as soon as the alcohol has evaporated, prints can be made from it. Care must be taken to wash the films thoroughly before immersing in alcohol. Otherwise the emulsion will grain.

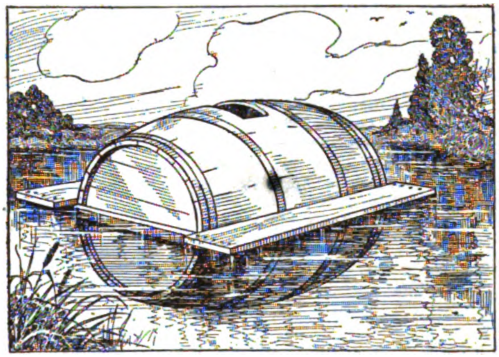
To Prevent Flapping of Shades

Window shades which are so located that in windy weather they flap in and out of the window are always injured by this action and speedily develop cracks or wear out. It is possible to rig up a guiding cord which will prevent entirely this flapping, and at the same time will not be so conspicuous as to injure in any way the appearance of the window. The method, which is similar to that widely employed in railway cars, is shown in the sketch; four small screw eyes, attached to the top and bottom of the window casing, have the ends of a cord tied to them and two more screw eyes are placed in the ends of the stick at the bottom of the shade. The cords pass through these two screw eyes, and the curtain can thus be raised and lowered as freely as before, the only effect of the cords being to prevent the shade from blowing out of place.—Mrs. Grace E. Willey, Concord, N. H.



Trap for Catching Muskrats Alive

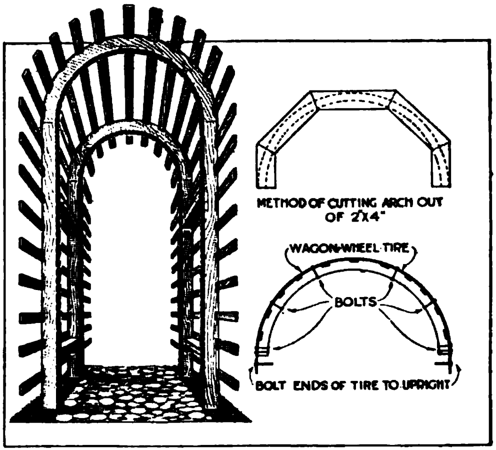
In the spring, when green food is scarce, muskrats may be easily trapped for their pelts. These little fur-bearing animals abound in our small streams and marshes, and their hides find a ready and profitable sale. They are fond of green food, and, as this is scarce in the early spring, the rats enjoy eating such vegetables as carrots, apples, turnips, and other tempting bait.


A Trap Made of a Floating Barrel Baited with Green Vegetables Catches Muskrats without Injuring the Pelts, Which Thus Bring the Highest Price

A homemade device for trapping these animals alive can be made from a barrel by cutting out a section of the staves, about 10 in. square, leaving the two barrel heads intact. Strong cleats are nailed to the ends of the barrel, with the ends of the cleats projecting about 6 in. on each side. On the cleats, boards 6 in. wide are nailed. The barrel is then filled with water until the boards on the sides are floating on the surface of the pond or stream, leaving about one-third of the trap above the water. The vegetables intended for bait are placed inside the barrel, where they will float on the water. The animal, attracted by this food, will jump into the trap where it will be imprisoned. The fur commands a much better price when the animal is trapped in such a way as not to injure the pelt.—H. V. Stanley, Chicago, Ill.

Wagon-Wheel Tires Form Garden Arch

An ornamental arch for the garden, on which a grapevine or other plant can be trained to grow, is made with the help of the two halves of an old steel wagon tire. The tire is cut in half, and a wooden backing for it is cut out of several pieces of 2 by 4-in. lumber, as indicated in the sketch. The dotted circles should be laid out with radii about 2 in. and 4 in., respectively, less than that of the wagon-wheel tire. When the tire is fitted to the outside of this curved wooden piece, there will then be a few inches hanging over on each end by which the tire is fastened to the uprights. The rails are laid in notches chiseled out of the wooden pieces, and the upper ones are held securely under the tire so that they cannot fall off, due to nails rusting out. The steel tire furnishes the strength of the arch, while the wooden backing furnishes stiffness and improves the appearance.—C. L. Meller, Fargo, North Dakota.


METHOD OF CUTTING ARCH OUT OF 2"X4"
WAGON-WHEEL TIRE
BOLTS
BOLT ENDS OF TIRE TO UPRIGHT

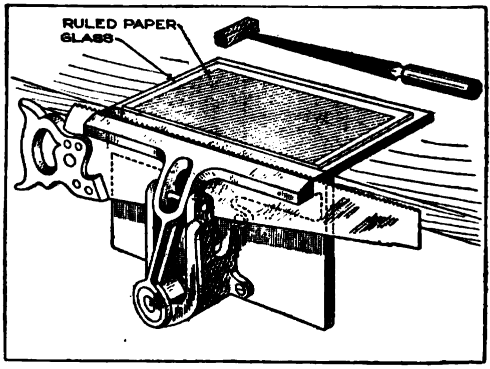
A Steel Wagon-Wheel Tire Forms an Important Part of This Ornamental Garden Arch or Grape Arbor

Ways of Filling Old-Style Fountain Pens

An old-style fountain pen may be filled in several ways, the regular medicine-dropper filler being handy, but not necessary. If a friend who owns a self-filling pen is near, his pen may be used in the same manner as the dropper. A good method for students or office people is to make a small funnel by rolling a piece of paper into cone-shape. This funnel must be held so as to leave room for the air to escape as the ink fills the pen. Another way is to dip a soda-fountain straw into ink, close the upper end, to hold the ink in the straw, place the end of the straw in the pen barrel, and remove the finger, thus releasing the ink. Repeat this until the pen is full.—J. W. Rodgers, Halifax, N. S.

Saw Filing Made Easy for the Amateur

Anyone can make an appliance that will not only be a help to the novice when filing saws, but may often make it easier for the expert. A saw clamp of any type is used to hold the saw. It is provided with a shelf, extending from the back and at right angles to the blade of the saw. A piece of glass, preferably about 1/4 in. thick, is secured to the shelf in such a manner as to be easily raised. Three sheets of paper, the size of the glass, are ruled with heavy lines so that they can be plainly seen, when placed under the glass. One sheet has the lines at right angles to the saw blade, to be used when filing rip saws. Two sheets have the lines ruled at angles, those of one sheet slanting to the right and of the other to the left, according to the bevel it is desired to have the teeth for crosscutting. The file is prepared by driving its point into a small block, about 3 by 1 by 1/2 in. The lower face of the block is to rest on the glass, and is slightly rounded. The position of the corner of the file, with reference to the curved edge of the block, determines the rake of the teeth. When ready for use, the proper sheet is exposed under the glass. The file, when in use, should be kept parallel with the lines on the paper. Except when the teeth are very large, it is better not to lift the block from the glass, but pass the file to the next tooth by raising the handle sufficiently.—W. R. Calver, Brooklyn, N. Y.

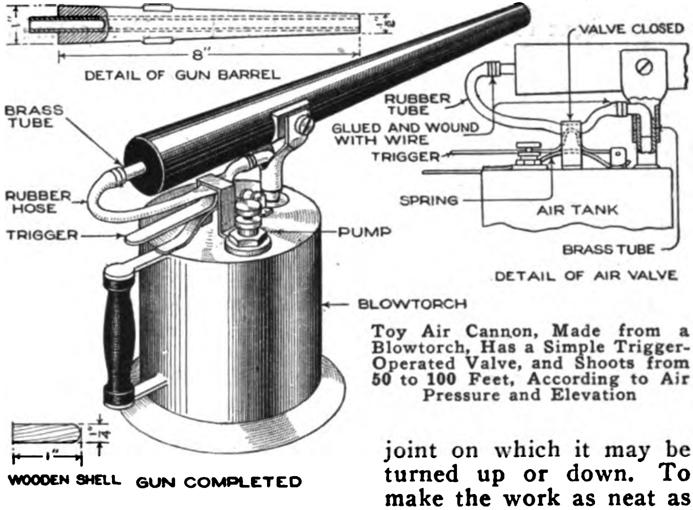


The Use of Guide Lines under a Sheet of Glass Makes It Easy to File Saws Properly

A Toy Air Cannon

By DALE R. VAN HORN

THE boy who has never owned a toy cannon that would shoot either accurately or with any length of range, will be well pleased with one which he himself can make, and which will far outshoot the average cannon sold in the stores. If the type of blowtorch used in the model described cannot be obtained, an excellent substitute may be constructed, using a bicycle pump to furnish the air pressure.



Toy Air Cannon, Made from a Blowtorch, Has a Simple Trigger-Operated Valve, and Shoots from 50 to 100 Feet, According to Air Pressure and Elevation

For the barrel of the cannon, a block of soft wood, 8 in. long, is required. In this a 5/16-in. hole is bored. To do this, clamp the block in a vise, and place the point of the bit in the center of the end. Then rest the forehead on the hand that holds the top part of the brace, so that it can be seen whether the hole is bored straight or not. Be sure to bore with the grain of the wood. After the hole is drilled, the block should be turned down in the lathe until the barrel has a diameter of 1 in. at the large, or breech, end, and tapers down to ½ in. at the small, or muzzle, end. If no lathe is handy the barrel may be cut out with a knife, and smoothed down with sandpaper, but in either case great care must be taken that the bore is exactly in the center of the stick. Since the hole in the barrel would be too rough for accurate shooting, a piece of ¼-in. No. 20 gauge brass tubing, 9 in. long, is driven into the bore from the breech, leaving 1 in. extending at this end. To finish the barrel, two wooden blocks, 1 in. long, ¾ in. wide, and ¼ in. thick, are cut to fit the curved surface of the barrel, and a ⅛-in. hole is drilled in the center of each. They are then glued to the stick, 2¼ in. from the large end, to serve as bearings. All the woodwork should be painted black.

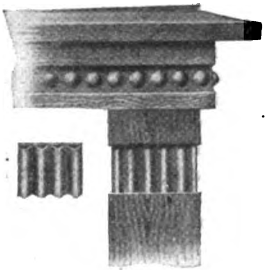
Furnishing a support for the barrel is the next step. First the torch must be taken apart so that only the pump and the pipe projecting from the tank are left as they were. Then a piece of brass tubing, large enough to slip over the pipe and 3½ in. long, is slotted with a hacksaw for a distance of 2 in. Be sure that this cut is exactly in the center of the tube. The metal on either side of the cut is bent to a U-shape, to fit around the bearings on the gun barrel. In each arm a ⅛-in. hole is drilled, into which a screw, such as can be taken from a dry cell, is slipped, with the head outside. The hexagon nut belonging to the screw is tightened on the inside of the arm. These screws are to fit into the bearings on the barrel of the cannon, to make a swivel joint on which it may be turned up or down. To make the work as neat as possible, the edges should be rounded with a file. The support is then slipped over the pipe on the torch. It should be tight enough so that, while it may be turned, it will not come off easily. In this way the gun may be swung from side to side, but will not fall apart.

The remaining parts of the cannon are the connections which bring the air to the brass tube in the barrel, and an air valve operated by a trigger. A piece of ¼-in. brass tubing is packed tightly with sand to keep it from crumpling, and bent to a right angle. The sand may be removed by tapping the tube against a board. One end is slipped into the pipe on the torch, and fastened with glue or plaster of Paris to make it air-tight. This is the air connection from the tank of the torch. A piece of sheet metal, ½ in. wide and 4 in. long, is bent into a square "U," 1 in. high, 1 in. wide, and with two ½-in. projections, one from each arm, which are to serve as legs. The "U" is turned upside down and soldered to the top of the torch, 1½ in. back of the pipe. This forms the upper member of the pinch valve. The trigger is a piece of heavy brass, 4 in. long and ¾ in. wide, bent to shape. At one end, a shingle nail, with the head cut off, is soldered as a pin. Two bearings are made for the pin from sheet metal, each piece ½ in. wide and 1¼ in. long, bent to a right angle, ½ in. on one leg and ¾ in. on the other. A hole is bored in the long leg of each bearing to hold the shingle-nail shaft. Slip the bearings on the shaft, and solder them to the top of the torch, halfway between the pipe and the U-piece already soldered on. Be sure that the trigger moves freely on the bearing. A piece of a clock spring is then bent to the shape indicated, and its rear end soldered to the top of the torch so that it will hold the trigger up against the square U-piece.

To complete the cannon it is only necessary to place the barrel of the gun on its support with the screws in the holes in the bearings, and to connect the air line with a piece of rubber tubing. The spring in the brass supports will hold the barrel firmly in position. A piece of rubber tubing, about 8 in. long, will be required. This is connected at one end to the brass tube on the gun barrel, then threaded through the valve while the trigger is held down, and finally connected to the brass tube in the pipe. To hold the tubing firmly the brass tubes should be given a light coat of glue, the rubber slipped on, and the joint wound with wire. The cannon should not be used until this glue has set firmly.

For ammunition, wooden bullets are used. These may be cut from sticks of the proper size, or made in a lathe. The gun is very easy to shoot. After pumping the tank full of air, tip the barrel up and slip in a wooden bullet, then aim, and press the trigger. The bullet will be shot from 50 to 100 ft., depending on the air pressure and the elevation.

Paper Ornamentation in Amateur Cabinetwork



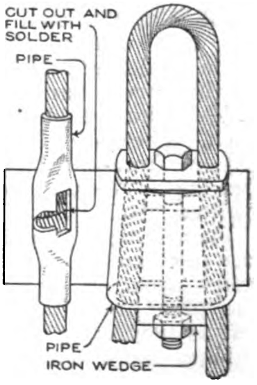
In order to introduce some ornamental effects in amateur cabinetwork, use may be made of some corrugated paper board, such as used for packing, and some strawboard which has small round studs embossed in it. Both are sunk well below the surface of the wood, in order to minimize the danger of marring them, and are firmly glued to the wood. Two or three coats of stiff shellac will do much to increase the firmness of the paper material, and if still greater strength is desired, the bosses and corrugations may be entirely filled with glue. It is not difficult to match the color of the strawboard to that of the wood, and the effect is quite pleasing. —W. H. Sargent, Rutland, Vt.

Novel Uses for Glass Push Pins

Glass push pins are particularly useful for temporary low-voltage wiring or amateur battery work. With them, wires can be run about the house without marring the woodwork or walls. After attaching pins at convenient distances, simply loop the wire once around each glass head, taking care to stretch the wire taut between pins. Two glass push pins, inserted so that they barely touch each other, make a toothbrush holder that is sanitary and individual. With a number of push pins, a holder for many brushes can be made.—Emile Parent, Ottawa, Canada.

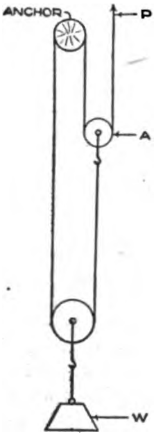
Emergency Cable Fastenings

There are times when it is necessary to improvise a splice or an eye in wire cable, for the mechanic who is doing the work is sometimes not able to do a professional job of splicing. Use of pipe in making a substitute has proved practical, and may be adapted to the needs of the particular case. For a line splice, it is only necessary to take a section out of a piece of pipe; give it a bulge at this point; cut a hole in the side of the bulge; slip in the ends of the cable; separate them with a chisel through the hole, and pour hot solder into the opening. For an eye, provide an iron wedge, a piece of iron with three holes in it, a long bolt, and a



piece of flattened pipe. The cable is threaded through the two outside holes in the piece of iron, which should be of the proper size to serve as a cap for the pipe. Inserting the iron wedge and securing with the bolt makes a very strong eye which has plenty of strength for most guy wires and ordinary uses.

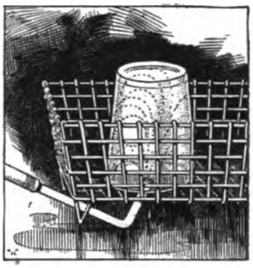
A Pulley Puzzle



Many a youth who believes that he knows just how to figure the forces in ropes and pulleys may be puzzled by the combination shown. He will, of course, start out on the well-known principle that when a weight hangs from a system of blocks and pulleys, the force necessary to apply to the rope may be found by dividing the weight by the number of ropes supporting it. With this principle in mind he will at once say, on looking at the accompanying diagram, that the "power" P, supplied to the rope to raise the "weight" W, will be equal to ⅓ of W. Now call to his attention the fact that the rope below the pulley A must have twice the tension of the two ropes leading up from it, or 2P; also, that W must be twice the tension in the two ropes which directly support it, or 2×2P, which is equal to 4P. By this time he will be puzzled as to whether the rule about dividing the weight by the number of ropes isn't perhaps wrong. However, if he understands the principle involved, he will at length figure it out in this way:

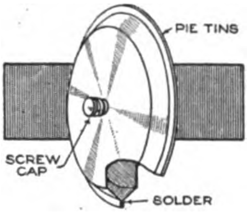
The whole question is whether the circle marked "anchor" holds the rope tightly as if nailed on, not permitting it to move around in either direction, or whether the rope moves around it freely as through the pulley. In the first case, the rope at the left will have twice the tension of the other two ropes, so that W is equal to 4P, as explained above. In the second case, if we assume a free-running pulley as the "anchor," then a careful inspection will show what must immediately happen. The weight will fall, pulling the rope around the anchor, until the pulley A has been raised up to the level of the anchor. This simplifies the condition, as there are then only two ropes supporting the weight, and the tension on each of them, or P, is equal to one-half of it.

Bent Tube for Rinsing Dishes



Where wire dish drainers are used, instead of wiping the dishes off with a dish towel, it is often found convenient to use a rubber tube attached to the hot-water faucet for rinsing them. This does very well for china dishes, but spraying the cups and tumblers quickly so that they will drain off and dry is not so easy. A very convenient way is to arrange the drainer so that the bottom of it rests a few inches above the bottom of the sink, and set the tumblers and cups upon it directly inverted. In the end of the rubber tube, use a nozzle consisting of a piece of brass, or glass, tubing, 8 to 12 in. long, bent as shown in the sketch. By holding this nozzle in the position shown, the cups and tumblers are rinsed out thoroughly on the inside, and the same nozzle is equally useful for spraying the water from above on the outside of the cups, and on the other dishes.

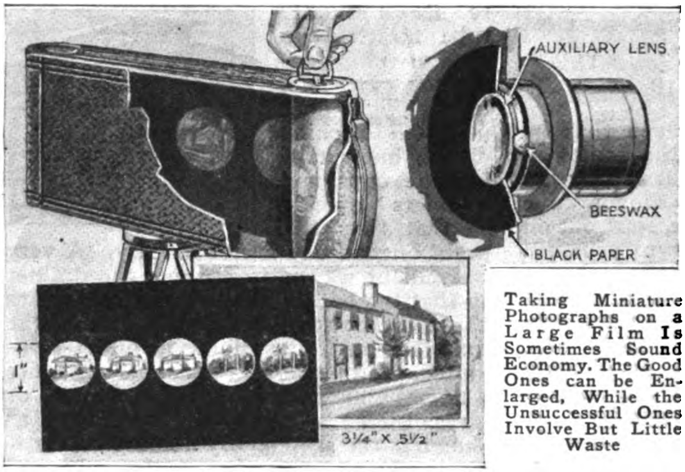
Hot-Water Bottle Made from Two Tin Pie Pans



A very good substitute for a hot-water bottle, or bed warmer, can be made from two tin pie pans. In the center of one of the pans is soldered the screw top of an old oilcan. Take care that the screw cap has a good gasket so that it closes the opening with a water-tight joint. Solder the edges of the pans all around, and make sure there are no leaks. A somewhat more convenient arrangement is to place the screw top from the oilcan in the edge of the vessel thus formed, the edges of the pans being cut out to form the opening for it. This makes a rather more difficult job of soldering, but if skillfully done, it will make a more satisfactory job.—James E. Barkley, Detroit, Mich.

¶Tallow makes a very good substitute for oil in driving drift pins.

Taking Miniature Photographs



Taking Miniature Photographs on a Large Film Is Sometimes Sound Economy. The Good Ones can be Enlarged, While the Unsuccessful Ones Involve But Little Waste

Any camera may be made to take smaller pictures than those for which it is built, by fastening an extra lens upon the rear face of the regular lens system. The results illustrated in this article were obtained with a camera designed to take pictures of post-card size, 3¼ by 5½ in. A thin, convex lens of 1¼-in. focal length was purchased from an optician, and was fastened, by means of two little pellets of beeswax at its margin, to the rear face of the regular photographic lens. If this auxiliary lens covers only the central region of the lens upon which it is fastened, it will be necessary to block off the light that would come through the ring outside the small lens, by a disk of black paper, with a hole in it slightly smaller than the extra lens.

To obtain the correct focus, the bellows must be pulled out only a short distance, the true position being found by trial. The position may be located approximately by removing the back of the camera, stretching a piece of tissue paper across where the film runs, and focusing as upon a ground glass. The focusing position may be considered fixed for objects distant 3 ft. or more from the camera.

It remains to tell how to turn the film forward the proper distance, after an exposure is made. It is easy to distinguish, when looking through the little red window at the moving paper backing the film, just when the paper (and film) has moved a distance equal to the diameter of the window. (The grain of the paper is readily seen through the window, and the attention may be confined to a certain spot on the paper.) Move the film forward by steps equal to the diameter of the window—two, three, or more steps as the case may be. For instance, if the little pictures are 1 in. across, and the observation window is ½ in. in diameter, the film must be shifted, between exposures, a distance equal to two diameters of the observation window.

As an auxiliary lens one may, of course, use the lens found in the view finder of the camera. The resulting photographs will then be about the size of a dime. A useful lens is one of focal length approximately half the focal length of the regular lens combination; the pictures being then somewhat larger.

With this device objects only a few inches away may be photographed. For very near objects a focusing scale should be marked out by trial methods. Objects 6 in. distant may be photographed. The modified lens system is not, of course, a "corrected" one; all the usual aberrations of single lenses will be present. Nevertheless, many pictures taken by the method described will be so fine as to be well worth enlarging.

The scheme presents interesting possibilities when one finds himself with but one roll of unexposed film in a locality where no films may be purchased and where one "just must take a lot more photographs."—L. Pyle, St. Louis, Mo.

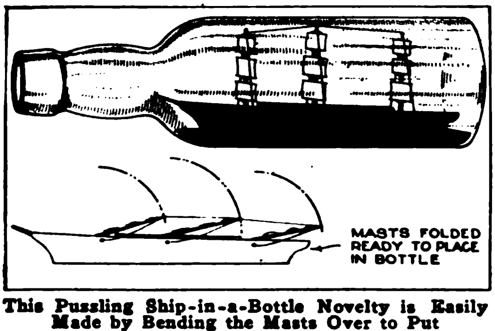
Foot Warmer for a Sidecar

A satisfactory exhaust heater for a motorcycle sidecar was made from a one-gallon oilcan covered with asbestos. A round hole cut in the longer side of the can, which forms the bottom, has a brass tube, about 1 in. in diameter, fastened in it, which passes through the floor of the sidecar and serves as an outlet for the exhaust gas. Another hole in the side of the can nearest the engine receives a piece of flexible metal tubing which is passed through the floor, or side, of the sidecar and attached to the exhaust pipe, behind the muffler. It will not be necessary to have a valve, as the apparatus can be removed when the weather is warm.—A. E. Crowther, Qu' Appelle, Sask., Can.

Putting a Ship in a Bottle

Many people, on being shown a full-rigged ship in a bottle, will naturally wonder very much how it got there. This novelty is quite easy to prepare, if one knows the right way in which to set about it.

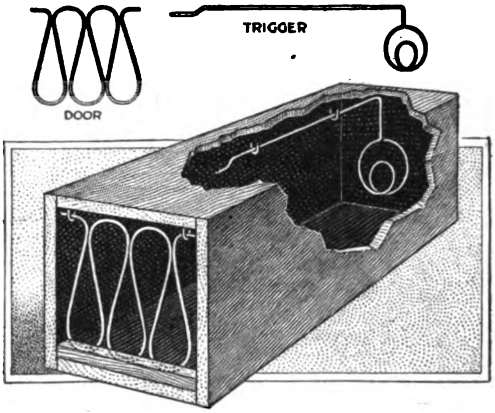
A good-sized bottle, of clear glass, should be used. When this has been obtained, the hull of the vessel may be cut out. It is best to make this of a solid piece of wood. The ship should be perhaps an inch shorter than the inside measurement of the bottle, and of a proportionate width. At intervals, in the deck of the craft, rather large holes should be bored for the masts, which should be of such a length that there will be room for them inside the bottle when they are upright in the ship. Paper or canvas sails, and thread rigging can be glued onto the masts. Get some green paint, which is to represent the sea, and pour some of this into the bottle while it is held horizontally. The layer of paint should be about ½ in. in depth. Then, bend down the masts of the ship, and put some strong glue into the holes. With the masts bent over in the manner shown, it will be easy to push the ship down the neck of the bottle so that it settles into the layer of paint. It only remains to pull up the masts. This is easily accomplished by means of a bent pin on the end of a thin stick of wood. The glue, being stiff, sets quickly, and the masts are then permanently in an upright position. As the paint dries, this also holds the hull of the ship firmly, and, after a few hours, the bottle may be handled without fear of anything breaking away.—S. L. Bastin, Bournemouth, Eng.


MASTS FOLDED READY TO PLACE IN BOTTLE

This Puzzling Ship-in-a-Bottle Novelty is Easily Made by Bending the Masts Over to Put the Craft in the Bottle

A Practical Rabbit Trap

A practical and easily constructed rabbit trap consists of a wooden box, with a wire door which is closed when a wire trigger is pushed by the rabbit on entrance. The box should be made of old boards, or new boards blackened with a stain not likely to offend the rabbit's delicate sense of smell. Five boards are required, two 1 by 6 by 22 in., two 1 by 8 by 22 in., and one 1 by 6 by 8 in. These are nailed together to form a square tube with the inside dimensions 6 by 6 by 22 in. One end is closed by the small piece.



This Practical Rabbit Trap Resembles a Log, Requires No Bait, and does Not Injure the Rabbit

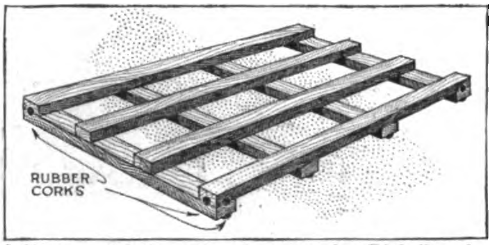
The door is made of heavy wire, hung loosely in the open end of the box from two staples. A small strip of wood must be fastened in the bottom of the opening to prevent the rabbit from pushing the door open when he is once caught. The trigger, also of wire, is hung from two staples in the top board of the box. The straight part of the trigger is 12 in. long, and the loop 3 in. in diameter. Be sure that the trigger is hung so as to slide freely through the staples.

In operation the trap is simple. It is set by pushing the door inward and upward against the top board of the box, and pulling the trigger forward until the door will rest on the hook.

Any green bait, such as lettuce, or a carrot, may be used, being placed in the closed end of the trap, but it is not absolutely necessary, the curiosity of the rabbit, and the likeness of the trap to a log being sufficient to attract him. As the animal enters the trap he pushes the loop of the trigger back until it releases the door, which falls behind him, leaving him a prisoner but uninjured.—Bertram Jackson, Logansport, Ind.

A Wooden Grating for the Sink

The wooden grating shown in the sketch, if used underneath dish pans and other large vessels in the sink, will go far toward preventing injury of the white enamel by the vessels knocking against it. The grating consists of four slats laid each way, about 1 by ½ in. in size. They are held together by nails, and are waterproofed with a coating of good waterproof paint or by immersing in hot paraffin. Small rubber corks should be sunk almost flush into holes bored in the ends and in the bottom of the grating, as an additional protection for the white-enamel surface of the sink.—Mrs. C. Michel, Jersey City, N. J.



A Wooden Grating Placed under the Dish Pan in the Sink Keeps It from Knocking against the Sides of the Sink and Damaging the Enamel

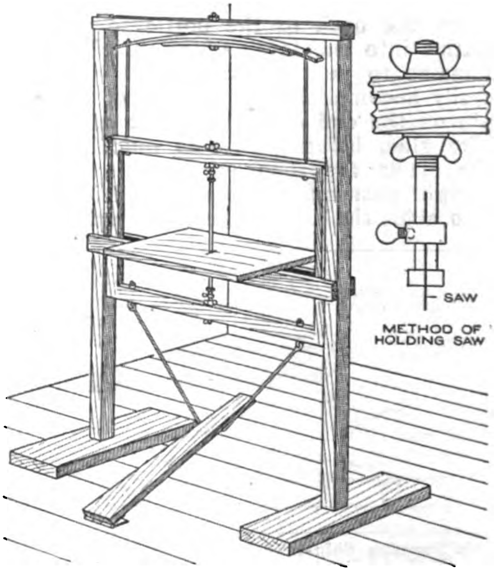
Cork Buffers on Medicine Cabinets Prevent Marring of Wall Paper

In hanging a medicine cabinet from picture molding, it is necessary to make the back hang parallel with the wall, and to protect the wall paper from the corners of the cabinet. Small corks, fastened to the corners on the back of the cabinet with screws driven through their centers, will fill both requirements. They should be countersunk so that the screw heads will not scratch the wall paper.

A Foot-Power Scroll Saw

The usefulness of the ordinary hand scroll saw is limited to the thinner, softer woods, and smaller work. A foot-power saw capable of handling large work, thicker and harder wood, and with less exertion, would for that reason be very welcome. Hard wood is best for the woodwork, but the better grades of soft wood will give good service. Two uprights, 7 ft. long and 3 in. square, are mortised at the bottom into heavy planks, screwed to the floor, the distance between the uprights being 4½ ft. They are connected at the top with a piece, 3 in. square and 5 ft. long, with mortised joints. The inner frame, which is to hold the saw, is made of two end pieces, 2 by 3 by 26 in., and two pieces for top and bottom, each 1½ by 3 by 54 in., held together with glue and screws. These top and bottom pieces are mortised into the sidepieces. A spring made of three pieces of ⅜-in. ash, planed to ⅛ in. at the ends, is fastened to the top beam with a bolt, and the ends are fastened to the saw frame with sash cord. The treadle is made from a board, 30 in. long and 1 in. thick, tapering from 4 in. wide at the rear end to 3 in. at the forward end. The wide end is fastened to the floor with hinges, and the narrow part is suspended from the saw frame by an iron rod, bent to shape and held by eyebolts. A table is provided to hold the work, 24 in. long, 18 in. wide, and 1 in. thick, with a 1-in. hole in the center for the saw to pass through. It is supported by two narrow strips, screwed to the uprights on each side of the saw frame. On each upright, two narrow strips are screwed, to serve as guides between which the saw frame will slip without swerving from side to side. This is necessary for accurate work.

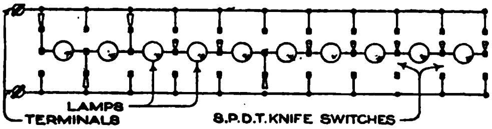
Ordinary turning-saw blades, 18 in. long, are used. They are held in two ½-in. bolts, slotted by a hacksaw for a distance of 1½ in. from the head end. Collars provided with thumb bolts are slipped over the slotted ends, and thumb nuts and washers added. The bolts are



A Power Scroll Saw, Operated by Treadle and Spring, Handles Larger Pieces of Work Than the Hand Turning Saw placed in the center of the top and bottom pieces of the saw frame, and held by washers and thumb nuts. To put the saw blade in place, slip the ends into the slots of the two bolts, and fasten it by tightening the thumb bolts in the collars. The thumb nuts are then adjusted so that the blade is held rigidly in the saw frame.—Tod Masters, Ft. Atkinson, Wis.

Lamp-Bank Rheostat Permits Fine Adjustment

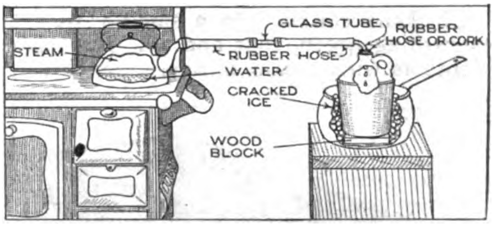
By using a number of single-pole, double-throw knife switches and lamp sockets, connected as shown, a rheostat of very flexible resistance is obtained, which is free from all short-circuit dangers, as the switches cannot be arranged to produce a "short." Another advantage of this type over the water rheostat, and even many of the carbon-disk resistors, is that the load is constant, so that the adjustment need not be changed during an experiment. By a simple manipulation of the switches it is possible to connect the lamps, all in series, all in parallel, or in any combination. Using 10 carbon lamps of the 110-volt, 32-cp. type, it is possible to obtain a current variation from 10 amperes down to one-tenth of an ampere. The sketch shows the first two lamps in parallel; the next three in series, but still in parallel with the first two; and the remaining five lamps disconnected entirely.—Victor H. Todd, Portland, Me.



Lamp-Bank Rheostat Which Permits Very Fine Adjustment, with Great Current Variation and without Danger of Short Circuit

Distilling Water without Special Apparatus

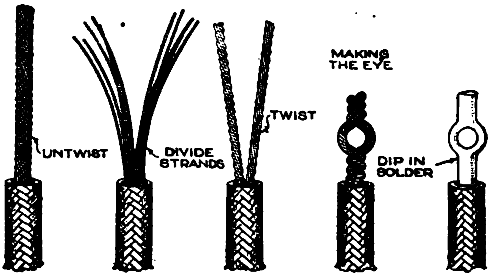
Distilled water is a necessity for the upkeep of storage batteries such as used in automobiles and farm lighting outfits, and is often recommended for the use of invalids where there are objectionable impurities in the drinking water. It is not necessary to purchase a still, in order to obtain water which is perfectly pure. The sketch shows how to rig one up from the objects shown. The essential principle of any still for this purpose is to present a cold surface where the steam may be condensed, and the resulting water collected. The jug surrounded by cracked ice provides such a surface, and it will be found that very little of the steam escapes condensation in the jug. If ice is not available, satisfactory results will be secured by the use of cold water around the jug, which, however, will have to be changed quite often, or kept steadily running. It is not advisable to use a metal container, as the purity of the water will not then be assured.—P. P. Avery, New York, N. Y.



An Apparatus for Distilling Water, Made from Familiar Objects Which Are Available in Nearly Every Household, will Provide Pure Water at Small Expense

Electrical Terminals Formed by Soldering

A satisfactory way of making a durable, efficient gas-engine ignition terminal is to form a solid loop at the end of the ordinary high-tension cable. The wire end is bared of the insulation for about 2 in., and the copper strands are untwisted and divided into two parts. Next, each of these sets of strands is twisted to make two large strands, after which the loop is made by twisting the two parts together for a short distance, then placing them around a small round rod and twisting the two ends together. The job is completed by dipping the loop in solder.



A Durable and Efficient Terminal for Ignition-System Connections is Made by Forming a Soldered Loop in the Wire

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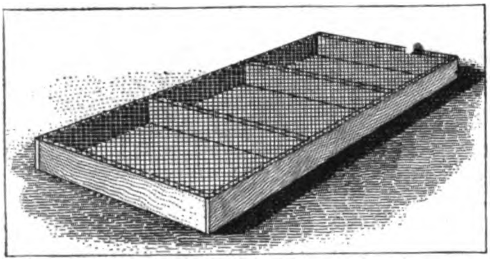
¶An ordinary lawn sprinkler may be used as a labor saver for curing concrete. It is only necessary to attach it to the hose and change its position occasionally.

Greens Protected While Growing in Chicken Yard

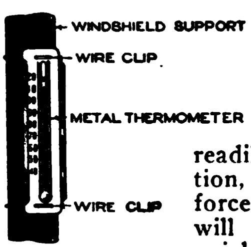
Chickens confined to a small yard eat everything green, root and all. But such plants as wheat, oats, barley, rape, clover, alfalfa, and many of the grasses, may be grown in a chicken yard, and furnish the required amount of green food, if they are protected while growing. A plank, or board, frame, 8 ft. wide and 12 ft. long, covered with poultry netting, will protect the roots and lower parts of the plants so that they will continue to grow, furnishing a continuous supply of green feed. The ground should be enriched with manure before planting, and must be watered occasionally.


A Frame Covered with Poultry Netting Protects Growing Plants, Which Furnish a Continuous Supply of Green Food for a Small Flock

The small frame illustrated will furnish green food for only a few hens, but it may, of course, be made as extensive as circumstances require.—Herbert A. Shearer, Chicago, Ill.

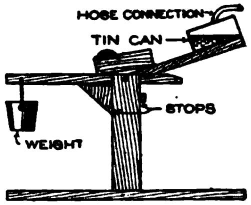
Thermometer Mounted on Automobile

A thermometer, mounted in some exposed position on the automobile, will keep the driver informed as to when the radiator and hood should be covered, or when the antifreeze solution, or other such measure, becomes necessary. A good place to put the thermometer is on the windshield support, on the driver's side of the machine, as it is readily seen in this position, and will get the full force of the wind, which will aid it in indicating quickly the temperature of the surrounding air. The best type of thermometer for this purpose is one which is mounted on metal rather than wood, and has metal guards at the side to protect the mercury tube. Such thermometers are often sold for photographic purposes. Two wires, run through small holes in the metal back and fastened around the windshield support, will hold the thermometer securely. The thermometer is not conspicuous, but will often be found very handy for reference.—G. I. Mitchell, Pittsburgh, Pa.



Simple Mechanism for Providing Intermittent Motion

In some chemical experiments it was necessary to keep the contents of a bottle agitated at intervals over periods of several hours. The apparatus by which this was done may be useful for many other purposes, and its construction is shown in the sketch. A beam consisting of two sticks of wood, set together at an angle, carries at one end a weight and at the other a can of water with an open end. Leading to this can is a rubber tube through which a very small stream of water is directed from a faucet. The weight at the other end is such that when the can is empty, it is forced to the top position. As the water flows into it, a point is reached where its weight exceeds that on the other end; the can then falls to a position just below the horizontal, and the water is poured out from it. Immediately the weight returns it to the upper position and the process is repeated indefinitely. The bottle to be agitated was placed in a box resting in the position indicated, so that every time the can of water emptied itself, the bottle would roll to the other end of the box and back again, thus agitating its contents.



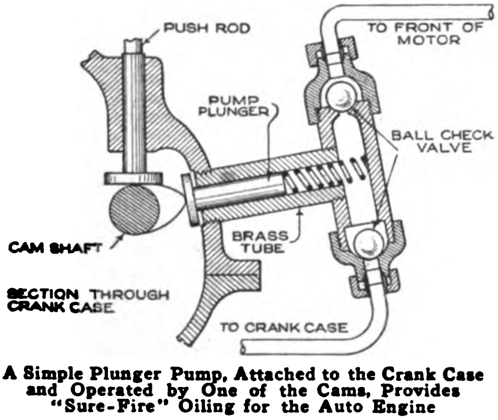
Various other uses for such an apparatus will occur to the experimenter, such as closing an electric contact at each movement and thus operating some mechanism which is being tested as to its durability under repeated use.—F. H. Mason, San Diego, Calif.

Convenient Type of Mail Box for Home Use

For those who have mail boxes flush with the side of the house, the following convenience is very practical. Cut out the back of the box with a can opener, and add about 5 in. to the body by soldering. After cutting a hole through the entire wall and fitting the inside with a neat frame and glass door, the mail box becomes really a convenience. The mail is visible from the inside, and fussing with a mail-box key in disagreeable weather is eliminated.

Oil Pump for Automobile Engine

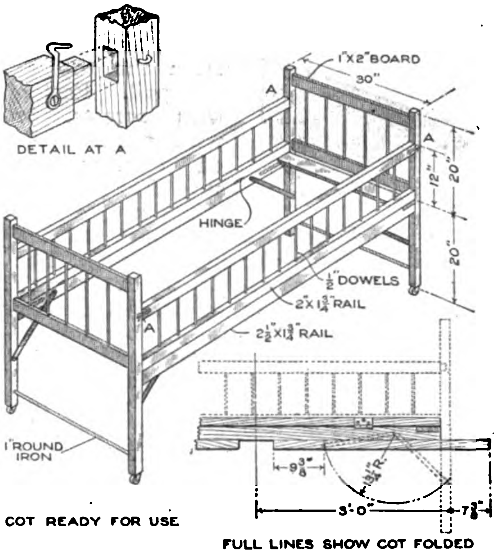
On an automobile engine which was oiled by the "splash" system, it was found that the tube which conducted the oil from the flywheel to the front part of the engine became clogged, and some burned-out bearings resulted. To prevent the recurrence of this accident, a pump was installed in the oil line and connected to be driven by the cam shaft, as shown in the sketch. The upper part of the motor crank case, on the camshaft side, was drilled out and tapped, opposite one of the cams, to take a brass tube, which was threaded with a standard pipe thread. This tube was reamed out to a snug fit for a small piece of shafting, which formed the plunger of the pump. Another piece of tubing was screwed onto the first, at right angles, and to the ends of it, through two ball-check valves, were attached the oil tubes leading to the crank case and to the bearings of the engine. These check valves acted to prevent oil from flowing back to the crank case, while permitting it to flow in the proper direction. On the end of the plunger was fastened a striking plate of hard steel, against which the cam pushed once during every revolution of the cam shaft. In this way the engine was provided with a force-feed oiling system at small expense.—G. A. Luers, Washington, D. C.



A Simple Plunger Pump, Attached to the Crank Case and Operated by One of the Cams, Provides "Sure-Fire" Oiling for the Auto Engine

Converting a Wire-Spring Cot into a Child's Folding Bed

A three-quarter folding bed can be assembled at very low cost by using a cot as a basis upon which to build. Even if it is necessary to purchase a new cot, the expense will be attractively low. The sides are made of 2 by 1¾-in. rails, tied together with ½-in. dowel-pin spindles. These sides are hinged to the rails of the cot. The upper piece of each side is tenoned at A, as detailed, to fit into one of the end posts. A hook and screw eye is used to hold each tenon in place. The head and foot are identical in construction, and are hinged to the rails of the cot with the same strap-iron links which carry the legs of the cot. When it is desired to fold the bed, so that it can be concealed in a closet or under another bed, the hooks are released and the sides folded down on the top. Then the head and foot, swinging on the strap-iron links, are forced to a position under the cot frame. Thus the bed can be concentrated so that it occupies but little space. When building a bed like this, it will pay to purchase a good cot frame which has three wooden-slat cross bars, on each of which are four coil springs to assist in supporting the main spring.—R. J. Stephens, Kansas City, Mo.



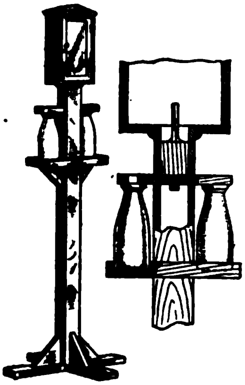
By Unfastening Four Screw Hooks, This Bed can be Folded Up So as to Occupy But Little Space

¶A pair of friction-joint calipers opened out with one leg clamped to the blade of a try-square forms a useful surface gauge.

Mop Wringer Built in Bucket

By fastening a galvanized clothes hook within a wooden pail, a satisfactory mop wringer may be easily constructed. Place the hook, with the opening down, about 4 in. from the top of the pail. Fasten with screws, or with round-headed bolts, making sure there are no sharp projections, and cut the bolts on the inside of the pail. Have the water level below the hook. The mop should be placed in the mop stick with both ends toward the handle, thereby forming a loop in the center to catch on the hook. Use the wringer by hitching the loop into the hook and turning the mop handle around. It will wring the mop as dry as desired, and the hands are kept dry. A galvanized pail may be used instead of a wooden one by having holes for bolts drilled through the side.

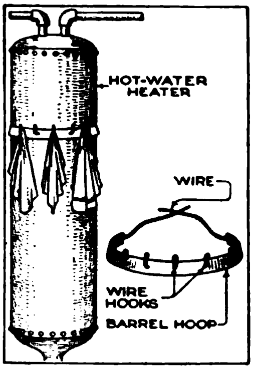
Milk Bottles Catch Pennies for Belgian Babies



An ingenious and attractive device for receiving money contributions on the street, or in hotel lobbies, for benevolent purposes, was recently devised in connection with the collection of funds for Belgian relief. The particular purpose of the money collected was to provide milk for Belgian babies, and the receptacles for the coins were milk bottles, painted white so as to look as though they were full of milk. Two bottles were mounted on a post, as shown in the sketch. They were fastened in such a way that they could not be detached without breaking the wooden pieces which held them, except by opening the box above, which was always kept locked. This box is used for displaying signs calling attention to the purpose for which the contributions are asked. By unlocking the cover and lifting from the inside of the box a block, which has a round handle projecting upward for this purpose, a pin is withdrawn from the center of the bar that covers the tops of the bottles, so that the bar can be slid out, permitting the bottles to be removed. This bar is provided with two slots for coins, one above each bottle. The person in charge of the collection carries the key which unlocks the door at the top of the post, giving access to the releasing mechanism.

Towel Rack on Hot-Water Tank

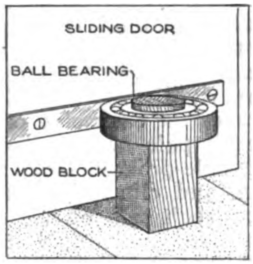
When there is a hot-water tank or reservoir in the kitchen, the warm, dry air around it is in splendid condition for drying dish towels, or other cloths, quickly. This may be taken advantage of by attaching directly to the tank a hoop, or ring, of metal, which may be readily made from a barrel hoop, and fastening in it as many hooks as one may care for. Stiff steel wire, or wire nails, make excellent material for hooks, and they can be riveted or soldered, or both, to the barrel hoop. The simplest way of attaching the hoop is to cut a piece long enough to go rather more than halfway around the tank, attach wires to the ends, and twist these wires together on the far side of the tank, which is not accessible enough to be useful for hanging the towels.—Warren F. Quackenbush, New York, N. Y.



Keeping Phonograph Records Handy

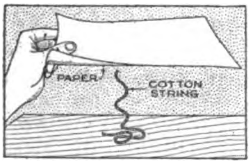
In order that a disk-phonograph record might be picked out of the cabinet without the necessity of referring to the index, or reading the title on the record, one man made a number of folders about 12 in. square. These were of heavy wrapping paper. One edge was allowed to extend forward farther than the other, and to the outside of it was pasted an oblong piece of white, cloth-backed paper. On this the title of the record was written. As the filing folders ran from left to right in the cabinet, the oblong pieces were pasted lower, in order to make the reading easy. This allowed them all to be in view. The longer edge of each folder made the filing and removing of the records easy. It would be possible to use the envelopes the records come in for the folders, but those made of heavier and wider paper are better.—Charles A. Goddard, Los Angeles, Calif.

Old Ball Bearing Forms Door Guide



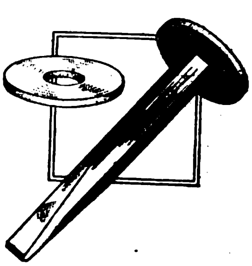
The sketch shows a novel door guide which was installed in a garage. It is made from a wooden block set into the floor and securely fastened. The upper end of the block is rounded off to fit an old ball bearing which had become too badly worn for further service in the car. A steel strap was screwed onto the door to protect against wear the part which would come against the ball bearing. If the block which carries the bearing is set into the concrete floor at the time the floor is laid, a very durable door guide is formed, and one which will not squeak or wear grooves in the door.—Frank W. Roth, Joplin, Mo.

Paper and String Demonstrate Static Electricity



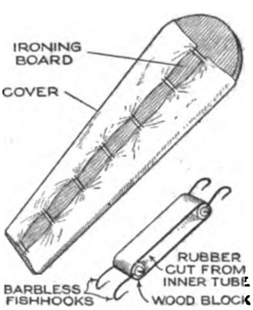
A most amusing demonstration of static electricity can be performed with a sheet of good-quality paper and a piece of ordinary cotton string. The string is laid loosely on the table, and the paper is electrified by rubbing it briskly with a piece of celluloid, a draftsman's composition triangle, or even with the hand. If the paper is immediately grasped and held a few inches above the string, the latter will leap up to meet the paper. By lifting the paper suddenly as the string rises up, a very comical effect is produced. The experiment depends very much on the dryness of the air and of the materials; it is impossible to perform any such trick when there is much dampness in the atmosphere.

Hand Guard for a Cold Chisel



The use of a cold chisel by anyone inexperienced with it usually results in the hammer occasionally striking the hand instead of the chisel, with disastrous results. For the use of beginners, and possibly some of the older workmen who occasionally fail to hit the chisel directly on the head, it will be helpful to cut out a disk of old leather belting, make a hole of the proper size in the center, and mount it on the end of the chisel to break the force of any misdirected blow.—J. H. Williams, Baltimore, Md.

Ironing-Board Cover Made Easily Detachable



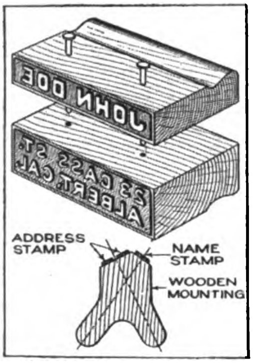
The cloth covering of an ironing-board is often permitted to become worn because of the difficulty of removing and replacing it. To avoid this, an ironing-board was fitted with a detachable cloth covering, as shown in the sketch. Four barbless fishhooks, four small wood screws, two short, round pieces of wood, and a section of a bicycle, or automobile, inner tube compose each of the fasteners. As many can be used as are found necessary to hold the covering securely to the board; when it is to be removed for cleaning, the hooks are detached at both ends of the fasteners, thus leaving the covering without any fastenings, which might get broken or injured during the washing.

Stains on Photographs after Fixing

The brown or yellow stains, which are sometimes found on photographic prints after being taken out of the fixing bath, can be prevented by mixing a tablespoonful of vinegar in the water in which the prints are washed after being developed.

Rubber Stamp Made in Two Parts

Anyone who does much corresponding will find it convenient to have a small two-line rubber stamp with his street and city address, and will also have frequent use for another stamp to print his name only. For still other purposes, it is useful to have all three lines in one stamp. This can be accomplished without having three separate stamps, by mounting the two first-named stamps on rectangular blocks of wood, and fitting them together as illustrated. Two small nails are driven through the thinner mount and fit into holes in the other one. These holes may be made by means of the nails themselves, as the set should be a tight-working fit. In this way, either stamp can be used by itself, or the name block can be attached to the address stamp by merely pressing the two nails into the holes, thus forming practically one stamp. The nail holes must, of course, be located while the two stamps are clamped together in the proper position, so that their printing surfaces are exactly in the same plane.



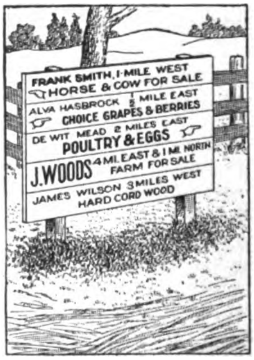
Another way of doing this is to mount the name stamp and the address stamp on the same block, but on surfaces at an angle with each other. When the name and address are both to be printed, the stamp is inked by a rocking motion on the pad, bringing both parts of it into contact with the inking surface, and the impression on the paper is made with a similar motion. If the angle at which the two stamps are placed is correct—it should be about 120°—it will be found that the combined impression can be made in a time scarcely any longer than that necessary to use an ordinary stamp. Then, when either the name or address is wanted separately, it can be printed in the ordinary manner by turning the stamp to the proper angle. A handle, or molding of the mounting block to the shape shown, will be found convenient, as it will help in holding the stamp correctly, but this will not present any difficulties after a little experience in using the stamp. This method of mounting the rubber stamps may also be found useful in an office for various other combinations of words.—H. R. Dunn, Chicago, Illinois.

Repairing Broken Canoe Paddles

The blades of canoe paddles crack and break very easily. Around a boathouse they soon accumulate, representing a good deal of waste. To the private owner a broken paddle often means that he must stay off the water for several days. The ordinary method of repairing, by using copper strips, is not pleasing to the eye, and does not lend itself to the emergency need of the private owner. A strong, quickly made repair can be effected by using double-pointed tacks. These should be large, strong tacks of brass, or at least galvanized. After clamping the parts of the blade together as tightly as possible, drill very small holes on each side of the crack, spacing each pair of holes to the width of the double-pointed tacks. The tacks are put in, and clinched, using them alternately on each side of the blade. In case the paddle has a thin strip broken off one side of the blade, it may be advisable to drill $\frac{1}{16}$-in. holes from the side, through which thin wire nails are driven, double-pointed tacks being used after the strip has been nailed to the blade. Repairs made with tacks and nails as suggested have actually kept paddles in use for years after the first break, without requiring additional mending.—Roy B. Snow, Toronto, Can.

Crossroads Sign Goes after Business of Motorists

Many farmers are becoming very much alive to the fact that it is profitable to sell their produce direct to passing motorists. Fair prices can be had in this way, and there is no expense for transportation or delivery. A number of farmers in one locality attracted a considerable amount of this kind of business by erecting a signboard where two automobile highways crossed, which advertised their location and what they had for sale. The device was apparently ap-

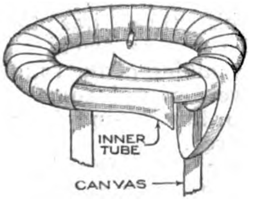


preciated by motorists who happened to be looking for the products which were mentioned on the signboard.—H. S. Rich, Hartford, Conn.

Filtering River Water for Drinking Purposes

It sometimes becomes necessary to drink river water. A fairly safe way to do this, if there is no opportunity to boil the water, is to strain it through cotton. Get a piece of ¼-in. rubber tubing, several feet long. Form a cup by taking half of a rubber bulb or some other material convenient at hand. Fill the bulb with cotton batting, and place the bulb end in the water. The water drawn through the tube will be clear, and much purer than without the filter.—James E. Noble, Portsmouth, Ontario, Can.

Air Cushion for Invalid Made from Inner Tube



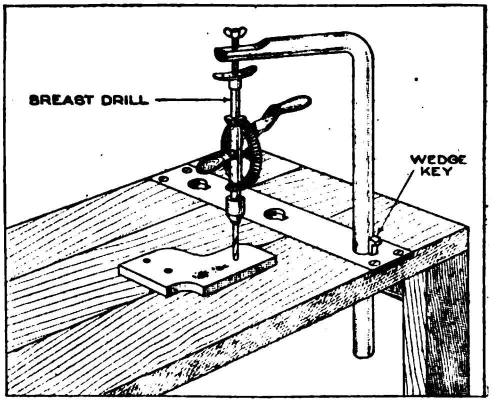
An automobile or motorcycle inner tube, which has blown out in one or two spots without losing entirely its ability to hold air, may be made into a pneumatic cushion for the use of an aged person or invalid, by simply cutting it in two at one of the weak spots, vulcanizing each of the ends, repairing any leaks or holes, and forming the tube into the shape illustrated. It should be wound, while inflated to a low pressure, with strips of stout canvas or burlap; the pressure can then be increased to whatever is required. Some motorcycle tubes are manufactured with closed ends, and these are especially adapted for this use

An Improvised Pendant Switch

A pendant switch, which is even more convenient than most of the manufactured ones, is formed by screwing a fuse plug into an ordinary pull socket. The switch thus formed must, of course, be connected in series with the light, or lights, to be controlled, and not across mains like a lamp socket. Any key socket can be converted into a pendant switch in this way, but the type operated by pulling a chain makes a particularly convenient switch.—Loe Addy, Newcomerstown, Ohio.

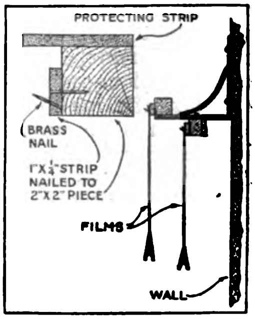
Drill or Brace Made More Effective by "Old Man"

A simple rigging, as illustrated, for the amateur's workbench, will frequently enable him to use his bit brace, breast drill, or a hand drill with almost the effectiveness of a drill press. The only change necessary to make in the brace or breast drill is to cut a center in the top, to take the point of the feed screw. The "old man" is made of an iron bar, or pipe, fastened in a bar, set into the bench by means of a wedge key, and may be quickly adjusted to various heights by releasing the latter. The bar may have several holes cut at different places to receive the bar or pipe, so that it can be set in various positions.—Chas. H. Willey, Concord, N. H.



An "Old Man," Consisting of a Bent Piece of Iron Bar or Pipe, Applies Great Force to the Bit Brace or Breast Drill

Quick Method of Hanging Up Films to Dry



When a number of roll films are being dried after developing, the time necessary to hang them up and remove them is quite appreciable. One of the quickest methods of hanging them is to have a number of brass nails in strips of wood mounted along the wall, as shown. If there is any danger that a person may run against these projecting nails, the strip should be covered with another strip of wood or iron.

DIVING FOR DOLLARS OFF ALASKA

By WILLIAM FLEMING FRENCH

"IT wasn't so bad during flow tide, but at ebb, when the cold currents swept out from Prince William Sound, carrying with them the icy waters from the Chugach Mountains, my nerve oozed right out through my diving suit. Many a time I've come up into the bright, warm sunshine, half paralyzed with cold. While working close in to the shore we were well protected, but when we worked out into the strait to pick up anything that the ebb tide might have carried back, it was like jumping into a cold plunge. And other times, when the sun was out of sight and the wind favored us with a whiff from up Hanagita Valley way, we'd get a chill straight from the Klondike, I believe. Anyhow, it was tough, and we'd never have stuck if the pickings weren't worth it."

This from one of the adventurous divers who were diving for dollars off Cordova, Alaska. A half dozen of them there were, and they had reaped large rewards for their daring—for diving in treacherous Alaskan waters is no gentle pastime. The millions of dollars' worth of unsalvaged ships and cargoes that lie off the rocky shores of the gulfs, bays, and sounds of Alaska prove that.

One small diving boat, operated by two men, cleared $1,400 in three days at this work. Others did almost as well. They were not diving for pearls, nor for gold, but for copper.

Because of the dangerous nature of the Alaskan waters, and because of the great ebb and flow of the tide at Cordova (due to the fact that the two islands that lie just off Cordova form a sort of natural runway through which the receding tide must race) the loading of copper from the great mines thereabout, onto the ships that carry it to the States, has been a risky business. As a result thousands of bags of copper were lost between the edge of the loading dock and the boats. These small, cube-shaped bags, weighing in the neighborhood of 50 lb. each, were at one time tossed from the wharf to the ships, later swung in by a loading crane, but now are loaded by a protected device whose nets eliminate the chance of a repetition of these losses.

But the harm had been done and, according to the estimates of one shipping agent there, over 50 tons of good Cordova ore lay on the bottom.

Then the prices began to soar, and in early 1916, when the allies were paying over 30 cents a pound for it, the 10 and 12-cent ore that had been lost a few years before looked like a gold mine to the mining and shipping interests of that territory. So steps were taken to reclaim the lost ore. A diving crew was employed and set to work.

This seemed to have the effect of the good old-fashioned gold rush. Individuals started diving—and specializing in pneumonia. Then up from Seattle came a couple of diving outfits, and another appeared from down Sitka way. More followed, and soon quite a little fleet was operating. Not always exactly within the law, perhaps, but certainly with great enthusiasm.

The ore lay mostly close to the docks, and this, of course, was salvaged by its legitimate owners. But hundreds of sacks had been forced up the narrow passage to the northeast by the incoming tide, or else dragged out into deep water by the outgoing waters. This, then, was the natural "game" of the private diver.

Due to the constant milling of the sand, many of these bags were buried, some at great depth, and, according to one diver, could never be recovered.

The bags of copper were found, in some instances, miles from the docks; and in one case, a half dozen bags were found on a bar just off Hinchinbrook Island, fully 12 miles from Cordova.

Just how much of this ore, in dollars and cents, has been reclaimed, no one seems to know, but an estimate, that is generally accepted as fairly reasonable, sets it at about $25,000.

GREATEST OF BRITISH MINTS ARE IN INDIA

The mints of India, at Bombay and Calcutta, together turn out more coins than all the other mints in the British Empire, it is claimed. This surprising output is easily accounted for when it is understood that not only do they supply the coinage demands of the 315,000,000 people in India but also of several other British possessions, including Egypt and the Straits Settlements. Furthermore, among primitive peoples coins are used to a greater degree than by the inhabitants of the more advanced countries.

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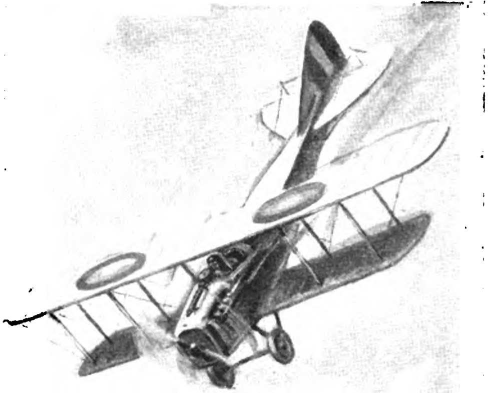
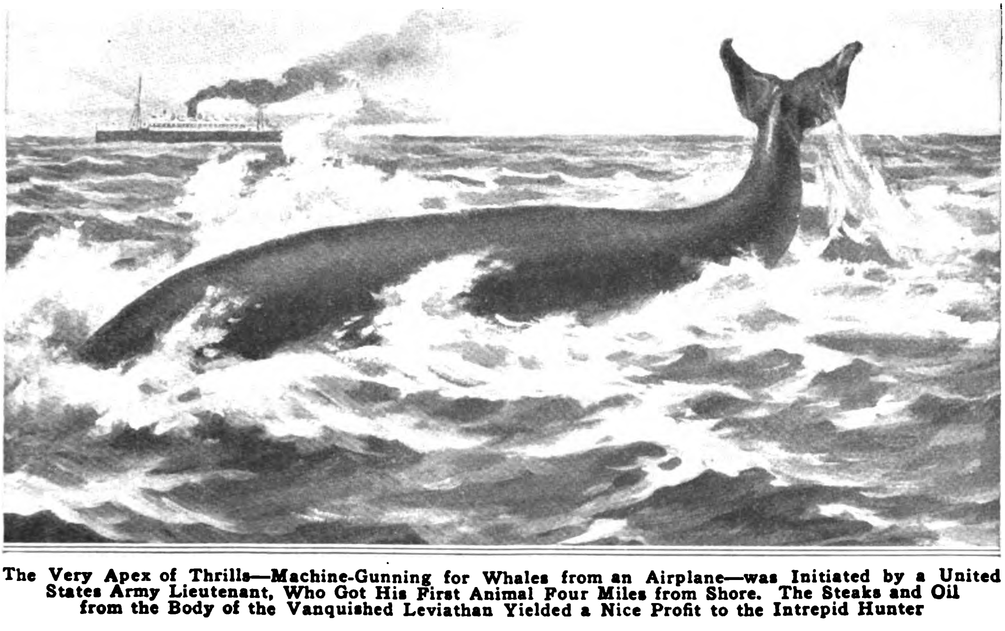
WRITTEN SO YOU CAN UNDERSTAND IT

Vol. 31 APRIL, 1919 No. 4

Aerial Hunter Goes Gunning for Whales

SPORT more extraordinary than shooting tigers from an elephant's back, or playing a quarter-ton swordfish with a casting rod, gave its initial thrill to an army lieutenant a short time ago when he went, in an airplane, machine-gunning for whales. From his vantage point a thousand feet in the air he saw his first game spouting four miles out at sea, and swooped down upon the big floating mammal before it could submerge. A sharp angle toward the sea, a quick tattoo of machine-gun bullets, a few lashings of foam, and the leviathan rolled over on its back. The successful hunter, flying back to shore, soon had a motorboat on its way out to pick up the kill. The vast carcass was towed ashore at Los Angeles, and a local packing firm

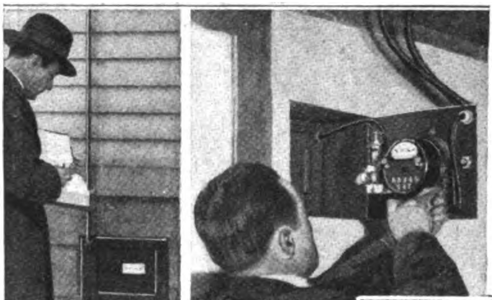




The Very Apex of Thrills—Machine-Gunning for Whales from an Airplane—was Initiated by a United States Army Lieutenant, Who Got His First Animal Four Miles from Shore. The Steaks and Oil from the Body of the Vanquished Leviathan Yielded a Nice Profit to the Intrepid Hunter undertook to dress and pack the meat. Whale steaks are considered delicacies nowadays, and besides, the flying Nimrod found a considerable profit in the large quantity of valuable oil taken from the animal. Perhaps there will have to be a closed season on whales when the sporting airplanes get to flying in numbers.

NO NEED TO ENTER HOUSE TO READ THIS METER

Miscreants who use impersonation of meter readers as an "open sesame" to dwellings on which they have designs, are now foiled by a form of meter which is read from the outside of the house. Time and annoyance are also saved both the reader and the housewife. The meter box, especially adapted for electric-light circuits, is built into the foundation wall of the building; this may be done, however, after the building is erected. Once in operation, the only way the meter box can be opened is by breaking the glass in front of the dials. The hand is then inserted to release the catch and the entire front door removed. After inspection or adjustment a new glass is put in and the door snapped shut, making the meter impervious to moisture or tampering.



Meter Box Built into House Wall Allows Meter to be Read from the Outside, without Annoying Reader or Housewife. It may be Tested by Opening the Back, inside the Building, as at the Right Above

By Breaking the Glass before the Dials the Front of the Box may be Taken Out to Adjust the Meter. A New Glass Makes It Impervious to Moisture or Tampering

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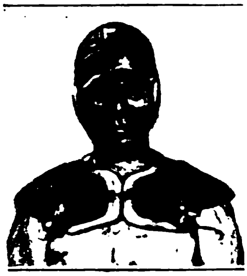
¶Two electric generating stations will be built in Morocco by a company with about $500,000 capital. The power will be used in Fez.

CATTLE VISIT IN CALIFORNIA OVER INCLEMENT SEASON

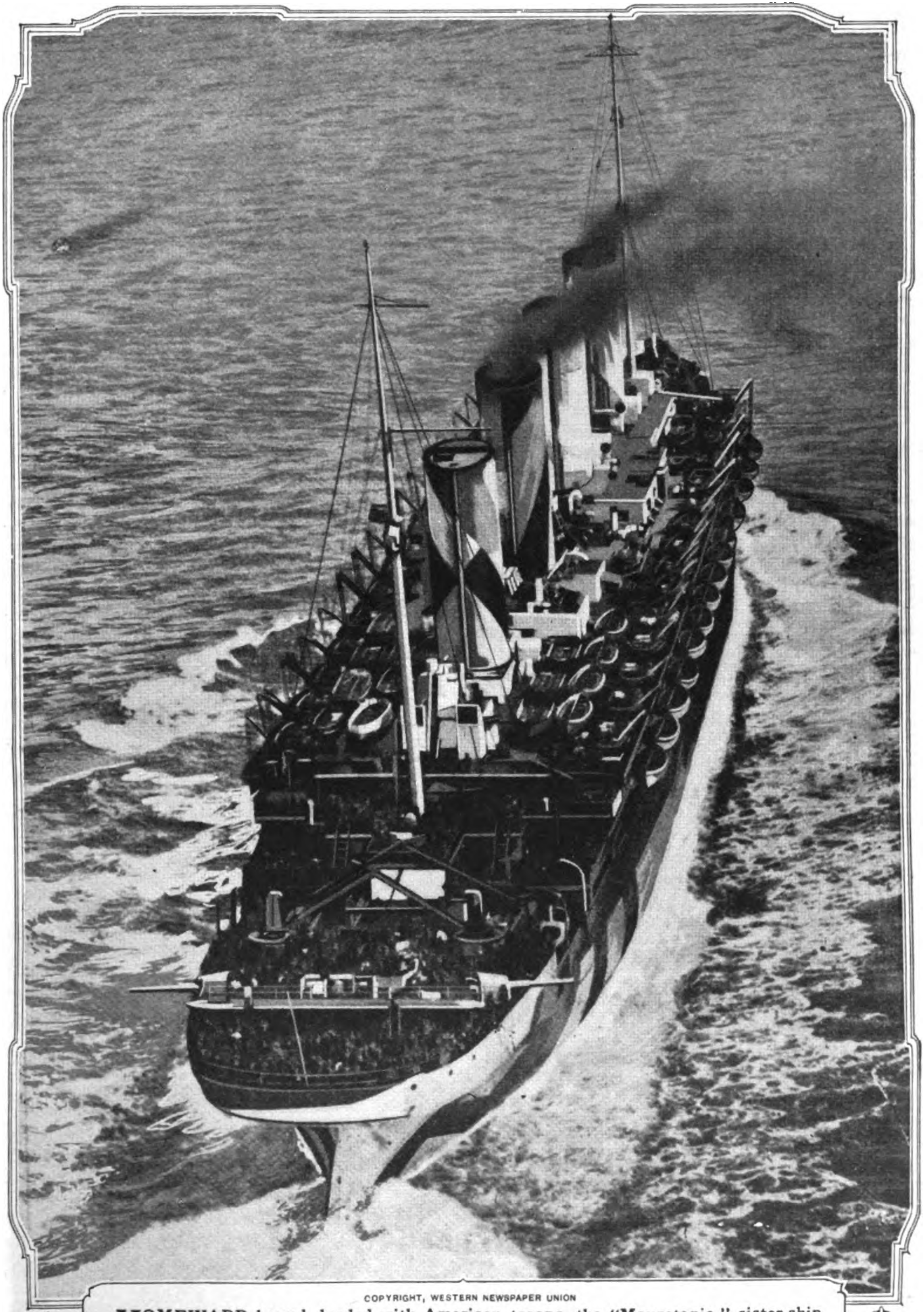
California pastures the past winter harbored several hundred carloads of Nevada cattle and sheep, shipped in to avoid the December and January cold of the open ranges. In the spring they will go back to their home state. Naturally, this winter resorting of common range stock is not specially altruistic, but is inspired by good business motives. California pastures afford more economical winter feed, and the sheep go through the lambing season with far less loss. With all the devices of tents and lambing wagons, bad weather often takes half the increase in lambs. So, change of climate is really an economical measure, with the recent prices for early lambs. Large numbers of stock are often moved from dry to green pastures, but this is the first important shipment recorded of range stock from a winter to a summer climate.

SHOULDER PADS AND HEAD GUARD FOR FOOTBALL PLAYERS

To reduce as far as possible the effect of impact of the player's cranium against Mother Earth, or other more or less solid objects, a football coach and official has designed a helmet and shoulder pads along improved lines. A series of leather pads, usually four, inside the helmet, are tightened with a drawstring, leaving spaces between them which act as air cushions. The shoulder pads are adjustable to the individual, and are shaped to give full protection to certain muscles sensitive to injury.



"MAURETANIA" BRINGS AMERICAN TROOPS HOME



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HOMEWARD bound, loaded with American troops, the "Mauretania," sister ship of the immortal "Lusitania," here is seen in unusual aspect. The picture, taken from an English dirigible, shows plainly the great trough the mighty vessel makes; but no adequate sense is conveyed of the immensity of this floating colossus.

ART AND ARTILLERY

By E. T. BRONSDON

"THERE'S a machine-gun emplacement up there beyond that clump of bushes, or in 'em. Because we came up so quick I ain't got the data, so until H. Q. sends it along you guys just concentrate direct fire . . . which clump of bushes? Oh, that one, up there to the left of that busted tank . . . say about a hundred yards north of the old tower at Bingville . . ."

This is exactly the fashion a civilian might have tried to designate a target for a battery of six-inchers. The fire sergeant and the expert enlisted gunners would have had a good laugh. It is exactly the manner in which a trained battery commander would not have issued the same order. This is more the manner:

"Approximate range 1,400 yards. In the immediate foreground a cairn of white stones—probably a Hun brass hat, or something. Two o'clock from there, 500 yards, a single tree. Twelve o'clock from the crotch, a disabled Willie. Eleven o'clock from there, a clump of bushes. Machine-gun emplacement. Bracket fire." And the men with the six-inchers would have "been with him all the way." There would not have been a question concerning the target, because he would have designated it exactly.

The reason why the trained man would have been able to eradicate all doubt in the minds of his subordinates immediately was because he himself had spent dozens of hours taking stiff instruction in the exact manner in which to make such a point clear. Time is measured in money in civil life; in war its bills are paid in blood. Confusion in commands means a loss of men.

When the officer himself was being trained, he was taken to a lecture room. Here several gigantic paintings were placed before him. Day after day he selected all possible targets, and according to a scheme of vocal designation based on clearness and common sense—the main principle being to take the listeners from the foreground to the target by easily recognized landmarks—he learned how to "place" anything accurately which the eye could see.

The big paintings used in tne officers' training camps and at the draft camps of the United States were furnished by our native artists, working under the supervision of the Division of Pictorial Publicity. Many came from the members of the Palette and Chisel Club.

The pictures themselves made little pretension to artistic merit. In most cases they measured 10 by 20 ft. in size, and were adaptations of smaller 'scapes that perhaps made some such claim. In each, however, the original subject had been laid aside; instead of the elimination of detail now so important in American art, detail

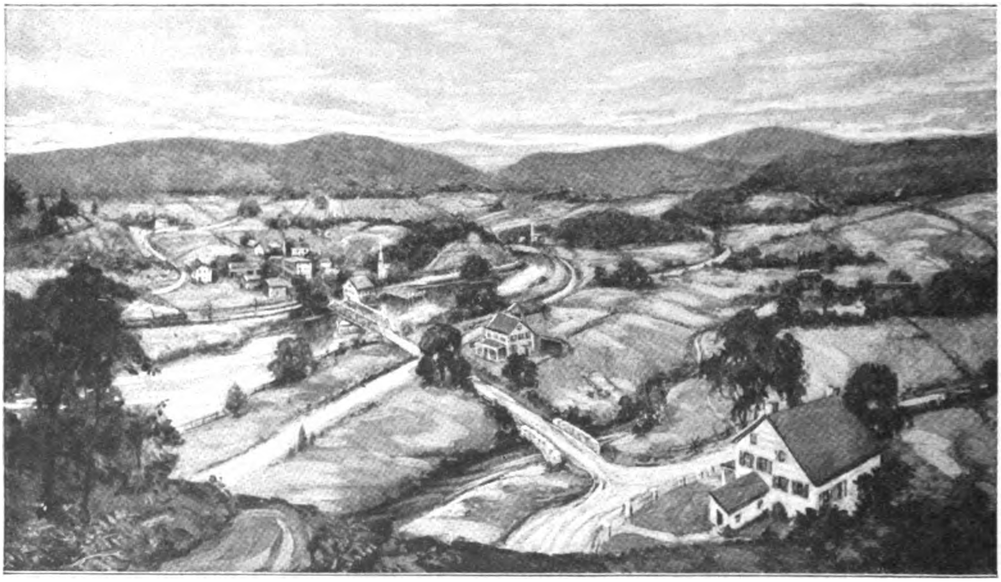
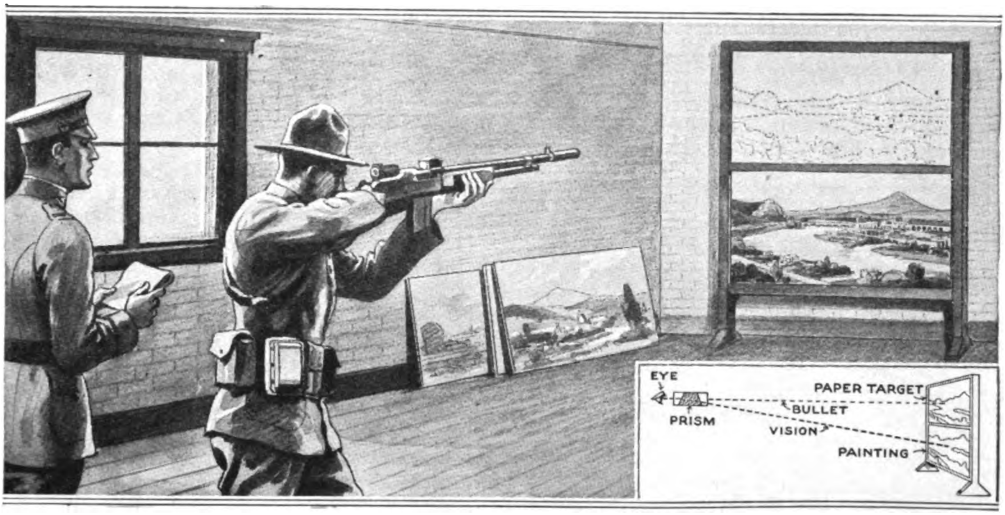


PHOTO BY JULEY, NEW YORK

Paintings Used for Instructing Soldiers in the Method of Designating Targets Measured About 10 by 20 Feet. They Made Little Pretension to Artistic Merit but Were Full of Detail



When the Paintings were Used as Direct Targets, a Prism was Placed on the Rifle to Change the Line of Sight, and the Bullets Passed through a Mimeographed Reproduction of the Picture. The Small Diagram Gives the Arrangement

was glorified. Just as many fences, houses, hedgerows, hills, roads, brooks, and other natural and artificial objects were crowded into the paintings as would be compatible with the aims of training. As art they became atrocities, but as textbooks in range finding they became useful.

Because artillery in the great war was nearly always concerned more with indirect than with direct fire, this training, while fundamentally necessary, was not as important as it was in the case of riflemen and machine gunners, who in most cases had to use direct fire. With these latter groups an addition to the system noted above was made.

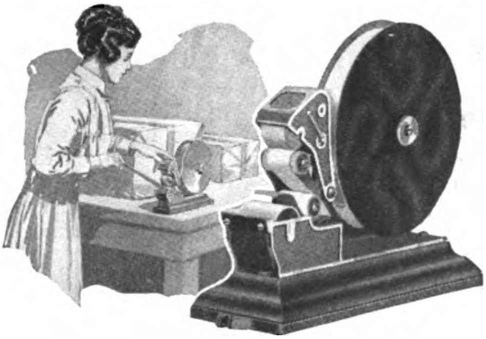
When the work in target designation was concluded, the paintings were used as targets. That is, the men aimed and fired their machine guns or rifles at objects designated to them which appeared on the paintings.

The manner in which this was done without riddling the paintings themselves was by the use of a prism lens, set on each rifle or gun. At a given distance from the target, this lens showed the painting while the muzzle of the weapon actually pointed above the painting itself. Thus, when the shot was fired at the "clump of bushes," or what not, the bullet passed above the painting, giving the marksman just as much practice in aiming and firing as if he had drilled a hole in the canvas.

Lightly mimeographed paper targets were set immediately above the paintings, and the range and prism lenses adjusted so shots registered hits on the paper exactly as the rifleman aimed and shot at the painting. After each paper duplicate of the painting had served its purpose it was torn down, and the accuracy of the fire criticized.

PRINTS GUMMED TAPE AS IT IS USED

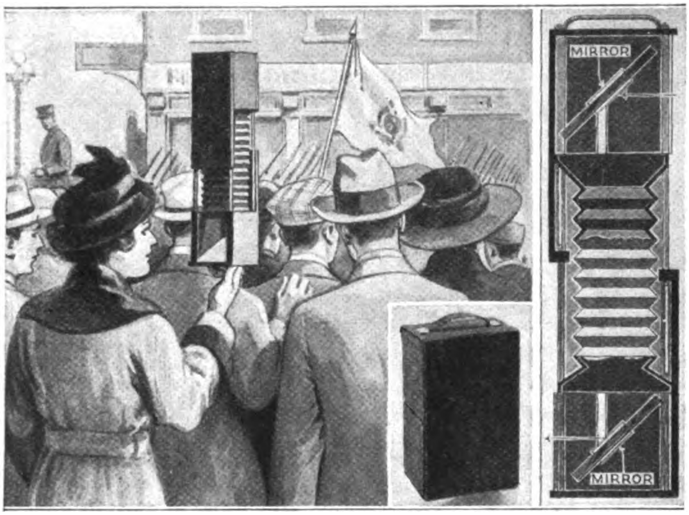
Since the price of string went up, gummed-paper tape has become the popular package fastener. Merchants who realize the value of advertising can get a small machine that will print anything they want on the tape while it is being pulled out for use. In a space only 10 by 8 by 2 in., this little mechanism holds 800 ft. of gummed tape, a printing press, a moistener, and a cut-off knife. When a strip of tape is pulled off for attaching to a package, it comes out with the gummed side wet and the ink side dry. The imprint is made every three inches.



This Little Gummed-Tape Printing Machine Has Its Printing Roller, Moistener, and Cut-Off Knife All in Plain Sight

COLLAPSIBLE PERISCOPE FOR USE IN CROWDS

Shortness of stature need no longer be a handicap to a person in a crowded street anxious to view a passing parade, or the like, if he is provided with a special collapsible periscope, recently devised for just such occasions. It consists of a case, having a mirror set at the proper angle at either end, which can be extended to a length of 2 ft., or more, by reason of a bellows connecting the two ends. With the device lengthened, the mirrors are exposed so that the user can see over the heads of a crowd without difficulty. Folded, the periscope looks like a box camera.



It Looks and Opens Up Like a Camera, But Is a Periscope, Designed to Give a Short Person in a Crowd a View of a Passing Parade. The Sectional Sketch at the Right Reveals the Optical Arrangement—Simply a Pair of Mirrors at a 45-Degree Angle

EXPERIMENTS WITH FISH OILS TO DETERMINE EDIBILITY

The Bureau of Fisheries has been experimenting for some time with various fish oils to determine the practicability of rendering them for edible purposes, and also of marketing them commercially. For a number of years past Denmark has been using vast quantities of fish oil in the margarine industry, and only recently Norway has taken up the matter with the idea of employing it in the same manner. Experiments thus far have shown that fish oil is excellent for making margarine that keeps and tastes well, and is even better suited for lard making.

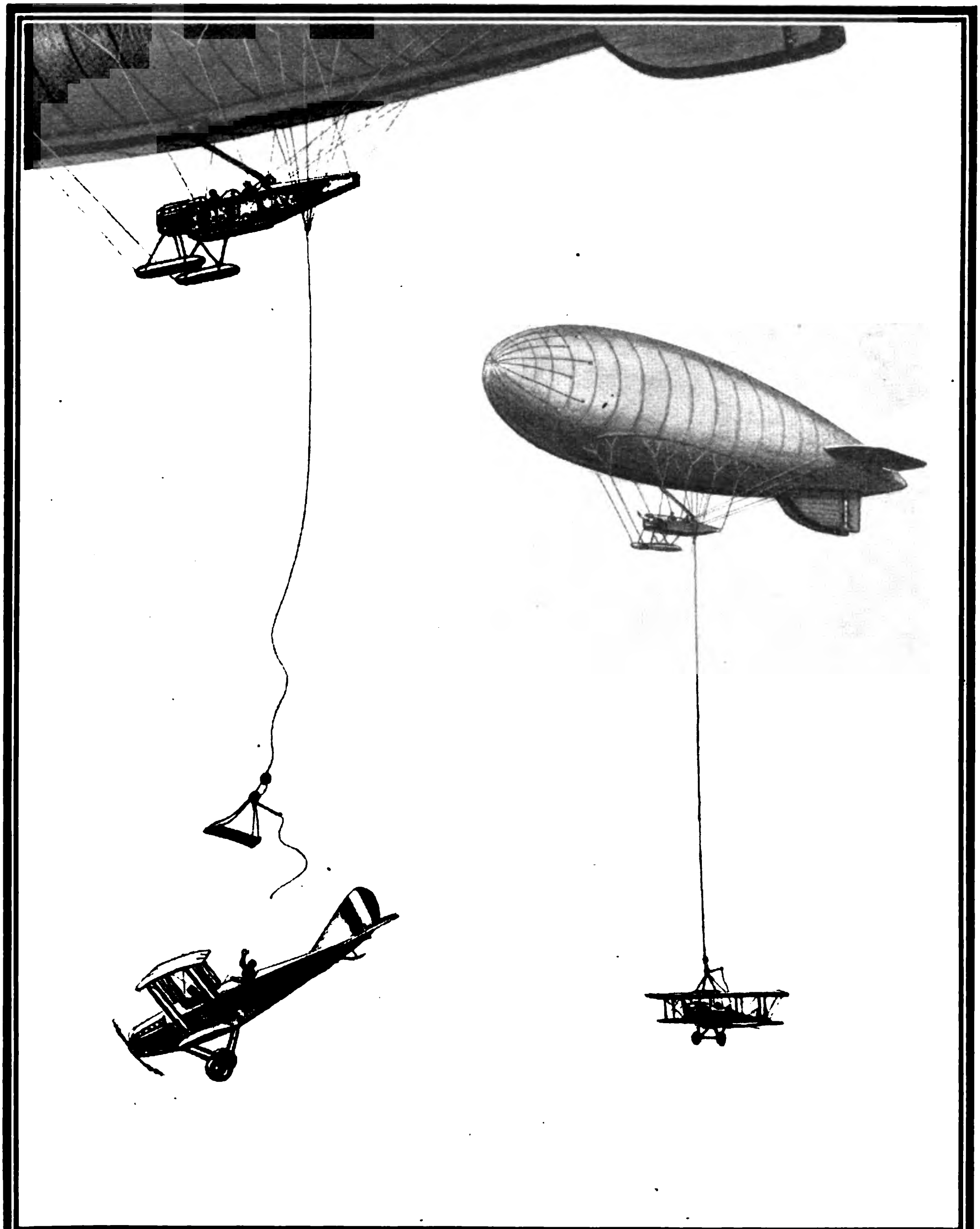
WONDERFUL RESULTS OBTAINED IN SUBSTITUTE SEARCH

That necessity is truly the mother of invention has been amply demonstrated by Germany in her search for substitutes to take the place of materials she was unable to obtain during the war. The thoroughness with which she prosecuted this search was made known at a recent festival held in Hamburg for the purpose of giving out the results obtained from their experiments with the lupine genus of plants. A Berlin professor has succeeded in removing all alkaloid and bitter substances from the seed of this plant and has thus made every part of it available for some use. At the Hamburg banquet the table cloth, every item on the menu, the soap used by the guests in washing, and even the writing paper and envelopes furnished, were made from the products and by-products of lupine.

WRIST WHISTLE FOR SOLDIERS AND POLICEMEN

The wrist whistle is becoming the companion of the wrist watch, and like the latter, is proving popular with army officers, a large number having been ordered by the government. The new whistle is of the siren type and is 3⅜ in. long and ⅞ in. in diameter. It is fastened to the left wrist by a leather band. In warfare and peacetime maneuvering it is of the utmost importance that an officer's whistle be instantly available for giving commands, and when attached as indicated, there is no delay in using it. The new article is also well suited to the needs of policemen, referees, and others.

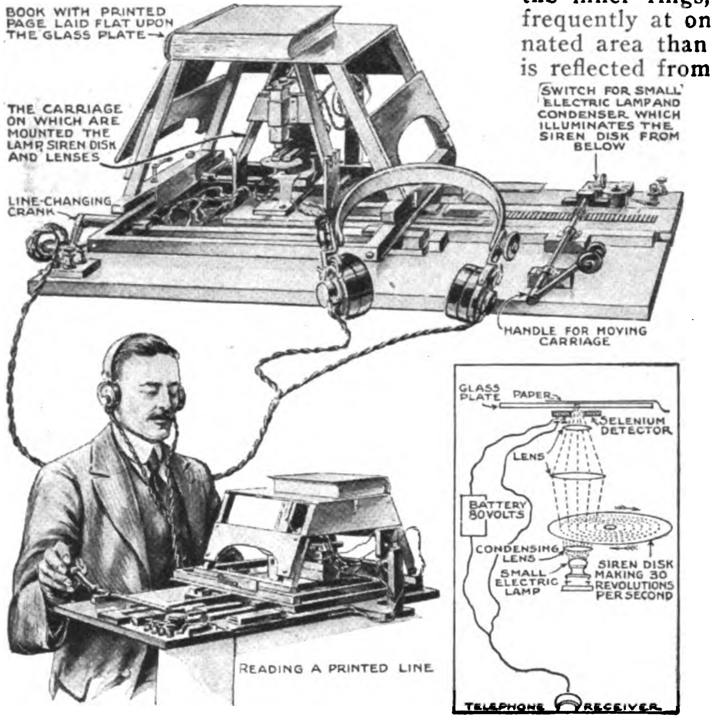
DIRIGIBLE LAUNCHES AEROPLANE IN MID-AIR



ROCKAWAY BEACH, L. I., was recently the scene of the unusual aeronautic experiment illustrated above. An army aeroplane suspended beneath one of the navy's "Blimps," at an elevation of 3,000 ft., was successfully launched in mid-air. A cable, possibly 100 ft. in length, was attached to the dirigible. At its lower end it was supplied with a contrivance apparently designed to fit over and grip the center section of the top plane. Means of instantly releasing the aeroplane were at the pilot's disposal. When the machine was freed, it dived several hundred feet, flattened out, and disappeared in the distance. No announcement has been made regarding the purpose of the test. It recalls, however, suggestions made in the past that an aeroplane and dirigible be combined so that in the event of the gas bag meeting disaster, the plane, taking the place of the ordinary nacelle, might be released in the manner described.

MARKED IMPROVEMENTS IN EAR-READING DEVICE FOR BLIND

Marked improvements have been made in the apparatus known as the optophone, with which the blind can read ordinary print by ear. As in earlier devices of this character, selenium is used in transforming light reflected by letters into sounds, each different from the other. With the new instrument, recently exhibited in London, a page is placed with printed face down on a glass-topped rack, beneath which is a movable carriage supporting a perforated selenium detector close to the page, while below is a lamp, the rays of which, concentrated by lenses, shine upward through a revolving perforated disk to the page. The perforations are arranged in five concentric circles, and the rays as they pass through them form a row of dots equal in length to the letter "l". Since the holes in the outer rings move swifter than those in the inner rings, the flashes occur more frequently at one end of the tiny illuminated area than at the other. The light is reflected from the letter on which the rays fall to the selenium, whose resistance is decreased in proportion to its exposure to the light. The result is, that, as different letters are illuminated, they produce different sounds which the reader learns to distinguish. It is said the characteristic sounds of each letter can be learned in the course of a few weeks. Thus far the actual reading record is about 10 words per minute, but greater facility is expected shortly.


BOOK WITH PRINTED PAGE LAID FLAT UPON THE GLASS PLATE
THE CARRIAGE ON WHICH ARE MOUNTED THE LAMP, SIREN DISK AND LENSES
LINE-CHANGING CRANK
SWITCH FOR SMALL ELECTRIC LAMP AND CONDENSER WHICH ILLUMINATES THE SIREN DISK FROM BELOW
HANDLE FOR MOVING CARRIAGE
READING A PRINTED LINE
GLASS PLATE
PAPER
SELENIUM DETECTOR
LENS
BATTERY 80 VOLTS
CONDENSING LENS
SMALL ELECTRIC LAMP
SIREN DISK MAKING 30 REVOLUTIONS PER SECOND
TELEPHONE RECEIVER

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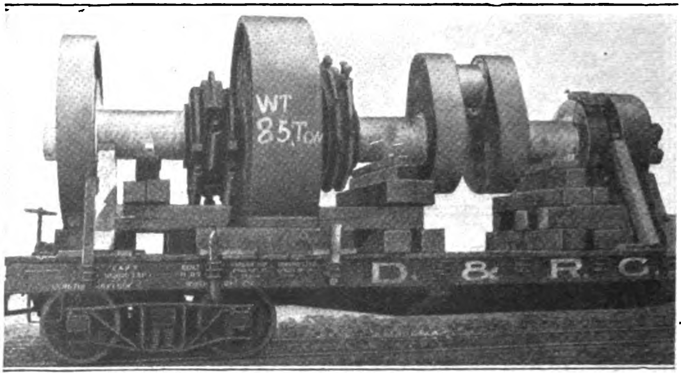
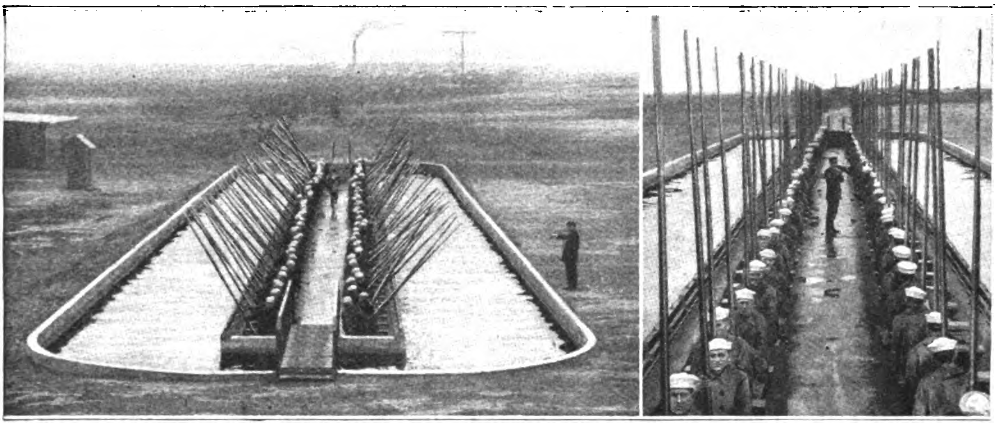
With This Improvement in the Optophone, Any Printed Page may be Laid Face Down on the Glass-Topped Stand and, with the Apparatus Underneath in Action, a Blind Person can Hear in the Telephone Characteristic Sounds for Each Letter. The Diagram in the Corner Shows the Location of the Selenium Cell, Light, and Shutter

CAST BIG STEEL CRANK SHAFT TO SAVE BUSY FORGES

Because all the forges which could have handled the work were busy on war orders, a crank shaft, 24 in. in diameter, was cast in three sections of open-hearth steel at Pueblo, Colo. The crank and shaft were fitted together by shrinking and keying, making a satisfactory job.



This Big Crank Shaft, 24 Inches in Diameter and Weighing 85 Tons, was Cast in Three Sections of Open-Hearth Steel Because All the Forges Were Busy on War Work



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With This Concrete Rowing Machine, Hard Aground in a Pond, the Sailors of the Naval Training Station at Cape May, New Jersey, are Trained to Handle Heavy Oars. The Officer Directing the Maneuvers can Cross the Bridge at Either End for a Shore View, as in the Right-Hand Picture

The total weight of the crank shaft was 85 tons, the wrist-pin diameter being 24 in. The cast shaft replaced a broken one on a 10,000-hp. stationary, reversible engine.

MAKE QUICK MOTION VISIBLE WITH RAPID CAMERA

It was discovered some years ago that movement too rapid for the eye to follow, when photographed with a motion-picture camera operated at a higher speed than usual and projected on a screen at the customary rate, was "slowed down" so that all its details were visible. The process has recently been applied to the study of swimming and diving movements. The evolutions of a trained swimmer are recorded on moving film at a camera speed eight times the usual rate. Projected at ordinary speed, the deliberate play of each muscle becomes clearly visible, giving opportunity for comparison not only between swimmers, but between that multimuscular sport and other forms of athletic effort. Besides its scientific value, the prolonged record of underwater maneuvers also has a pronounced spectacular flavor.

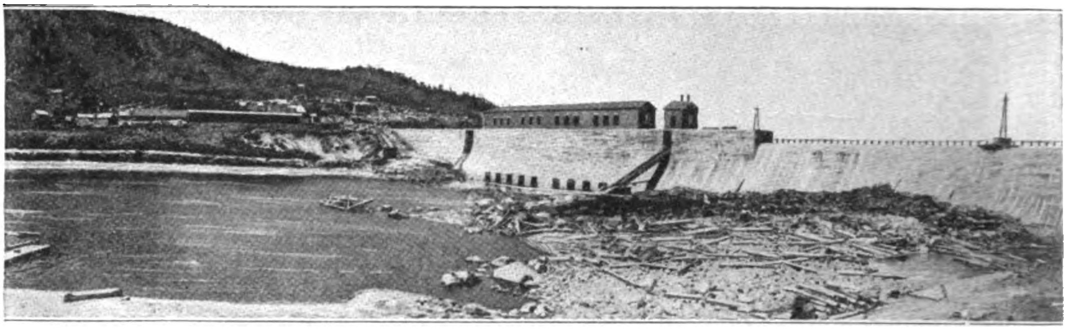
¶Orchardists and nurserymen are reminded that this is the year of the 17-year locust, which scientifically is the periodical cicada and not a locust at all. It also has a 13-year period, and is due on both counts in one part or another of the United States. Although the damage done is generally exaggerated, protective measures for young trees are advised by the Department of Agriculture.

CONCRETE "BOAT" AT CAPE MAY TEACHES SAILORS TO ROW

Those who have handled only the light oars of pleasure boats on a gentle sea may not fully realize the difficulties of managing the multiple-oared auxiliary craft used by the navy. For the purpose of training sailors in this necessary duty, the Naval Training Station at Cape May, N. J., has built a concrete rowing machine consisting of a dummy boat of huge size with a row of oarlocks the full length of each side. The machine was built on dry land, but now occupies the center of a concrete tank, or pond. A bridge at each end establishes permanent shore connections.

UMBRELLA-SHAPED COIN BANK WARNS OF "RAINY DAY"

"Save for a Rainy Day"—the good old admonition that grandfather used to give —stares the thriftless in the face from the top of a new coin bank for children and grown-ups. And if further warning is needed, the top of the bank is shaped in imitation of an umbrella in the position approved for rainy-day use. Even the slot into which the owner's coin is dropped suggests, by its form, a threatening dash of rain. The device affords a ready protection from the milder financial storms.



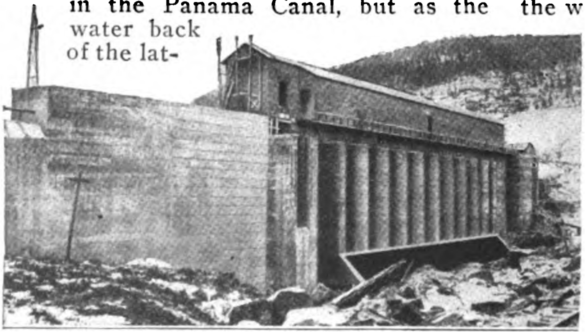
The Whole Downstream Side of La Loutre Dam, Quebec's Enormous New Storage Reservoir, Is Visible in This to a Width of 20 Feet on Top. It Contains 72,250 Cubic Yards of Masonry, All of the Material and Tools

QUEBEC HAS LARGEST STORAGE DAM IN NORTH AMERICA

By W. E. HOPPER

AN engineering work of unusual magnitude has recently been completed in the province of Quebec by the erection of an enormous storage dam on the St. Maurice River, designed to regulate the flow of that river which is used as a source of power by a number of large Canadian pulp, paper, and lumber companies.

It is known as the La Loutre dam, taking its name from the falls of that name, above which it is located. It is nearly 1,700 ft. in length, and when completely filled, will form a lake 300 square miles in surface area. The engineers engaged in the work claim that it is the largest storage dam of its kind in North America. In the whole world its storage capacity is exceeded by that of the famous Assuan reservoir in Egypt, and of the Gatun dam, in the Panama Canal, but as the water back of the latter is only used for a few feet on the surface it is in a different class from the La Loutre dam, where the water is meant to be used completely.



Upstream Side of the Main Section of the Big Dam, Including the Gatehouse and Sluiceways: The Latter are Covered with Steel Grating to Prevent Clogging by Timber, Ice, or Floating Rubbish

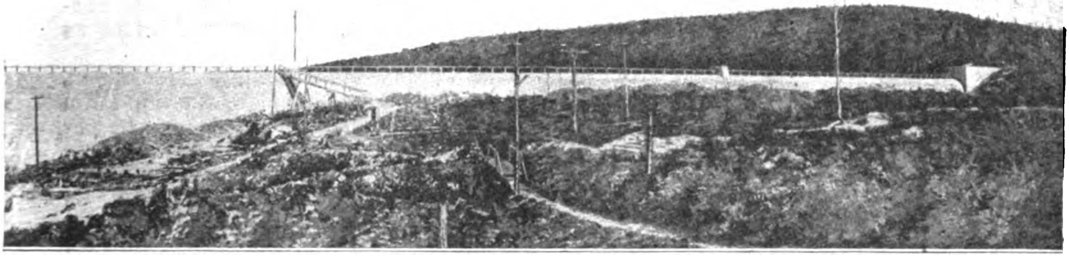
The St. Maurice River has a drainage area of 17,000 square miles. It takes its rise at a distance of about 360 miles north of Three Rivers. Its headwaters are from numerous lakes whose elevation is about 1,300 ft. above mean sea level.

The river is remarkable for its numerous falls and rapids, two of which are fully developed, and a third utilized only partially. Of the two developed, one is at Shawinigan with an available head of 150 ft., and the other at Grand'Mère with a natural head of 40 ft., and a possible head of 75 ft., as a result of the erection of the new dam.

The flow of the St. Maurice River varied from 200,000 cu. ft. per second during highest water to 6,000 cu. ft. per second at low water. The low-water stages occurred usually during August and September and the winter months, this being the cause of heavy losses by the industrial companies. It was to remedy this condition that the storage of water in the upper part of the river was decided upon.

In the summer of 1912, surveys were carried out and a dam site chosen immediately above the La Loutre Falls, at a distance of 240 miles, by the river, from Three Rivers; 50 miles above the mouth of the Mattawin River, a tributary of the St. Maurice, and about 40 miles due east of Parent station on the Grand Trunk Pacific Railway.

The Quebec Streams Commission, acting for the Quebec government, made contracts with the Shawinigan Water and Power Co., and other concerns, for the use of the storage water, and it is claimed that the annual revenue from

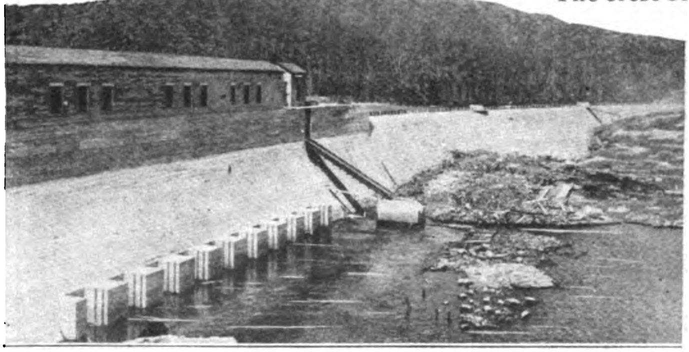


Panorama—a Concrete Wall Nearly 1,700 Feet Long, 80 Feet High, and Tapered from 72 Feet Thick at the Bottom for Which had to be Brought, by River Barge and Construction Road, 50 Miles from the Nearest Railroad Point

these contracts will leave a surplus, after deductions are made for interest, sinking fund, and maintenance. The contract for building the dam was let to a Montreal firm, who received $1,161,000 for the work. To this must be added the cost of surveys, plans, inspection, and administration, as well as the building of a hydroelectric plant and a 20-mile railway, bringing the total cost to about $2,500,000.

One of the big problems that had to be faced by the contractors was to get their building materials transported from the railway to the dam site. The method finally decided upon was to establish a base at Mattawin and to use the St. Maurice River as far as possible. Mattawin is about 50 miles from the dam site and all materials were first loaded onto specially constructed flat-bottomed barges and towed upriver a distance of about 30 miles. One of the obstacles to be overcome in this part of the journey was a rapids that had to be negotiated with the assistance of cables from the shore. At the end of the river trip, and at the foot of a long rapids that could not be successfully covered, another base was established, and from here a standard-gauge railway was built for the remaining 20 miles.

An idea may be gained of the magnitude of this transportation problem, when it is considered that all the railway equipment had to be carried up, as well as the material for building the dam, including some 300,000 bags of cement, 261 tons of reinforcing steel, and 452 tons of structural steel, and all the minor requisites for such a work, not forgetting a sawmill equipment, lumber for storehouses and dwellings, and provisions for the 500 men engaged in the work, during a period of more than four years.



This Downstream View Gives a Better Idea of the Sluice Outlets Than can be Obtained from the Panoramic Picture Above. The Log Chute, a Necessary Feature of North-Woods Dams, Is Also Visible

About two miles down the river from the dam a hydroelectric power station was erected, which develops 1,000 hp., and this was used in the work of erecting the dam, supplying light for the buildings, heating, cooking, etc. Since the completion of the work, the plant is utilized for the gate-raising machinery, lighting, or any purpose for which power may be necessary.

The dam is of the type known as gravity section, of so-called cyclopean masonry. Its maximum section is 80 ft. above the bed of the river and the minimum width on top is 20 ft. It is built in four angular sections, to conform to the topography of the stream, and varies in its dimensions. The base is at least three-quarters of the height, and its maximum width is 72 ft., the upstream face being vertical. It contains 72,250 cu. yd. of masonry. The crest of the dam from end to end, is 1,646 ft. long, at an elevation of 1,335 ft. above mean sea level.

The weir is 840 ft. long, and the dam is provided with 10 bottom sluices, each 12 by 7½ ft. wide, through which the flow of water is regulated by steel gates. There is also a log sluice for controlling the supply of logs for the lumber operators of the region.

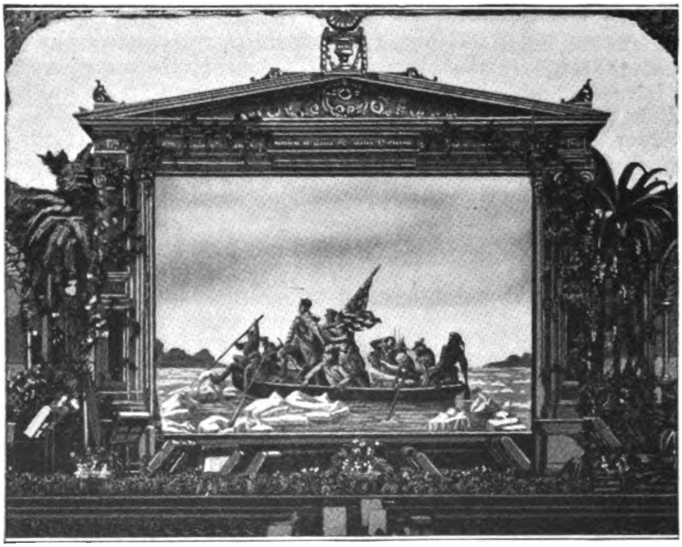
The dam will store the waters from a drainage basin of 3,650 square miles. It unites a series of small natural lakes, taking in 205 square miles in lake area, and when the reservoir is full, the engineers figure that it will form a lake 300 square miles in area. This means the flooding of some 95 miles of crown lands, some of it well timbered, but much of it barren. Its capacity in cubic feet is variously estimated at from 160 to 200 billion, and if all the water could be retained it would take three years to fill it. Last year was exceptionally wet so that it was possible to fill it to more than a third of its capacity.

The water thus stored, it is claimed, will be sufficient to regulate the minimum flow at Shawinigan to 12,000 cu. ft. per second. It will decrease considerably the spring floods and will increase the power at Shawinigan, Grand'Mère, and La Tuque to 67,000 horsepower.

While the dam was built principally for power purposes it will also benefit the log-driving operations on the St. Maurice River, and will give a tremendous impetus to the general development of the hinterland of Quebec.

REPRODUCE NOTED PAINTINGS FOR MOVIE PATRONS

That movie audiences are not wholly given over to the vulgar delights of slapstick comedy and galloping melodrama, but really have a large appreciation of the esthetic, has been demonstrated by the manager of Buffalo's largest theater. Reproductions of famous paintings, made large enough to fill the screen area of the theater, are presented every week and enthusiastically received. The initial presentation, at which Whistler's "Mother" was the main attraction, aroused so much interest that three artists were permanently engaged by the management to turn out a weekly art reproduction. Carefully studied lighting effects enhance the value of the presentations, which are locally regarded as constituting a popular education in art and a reproach to the cynic's theory of "popular taste."



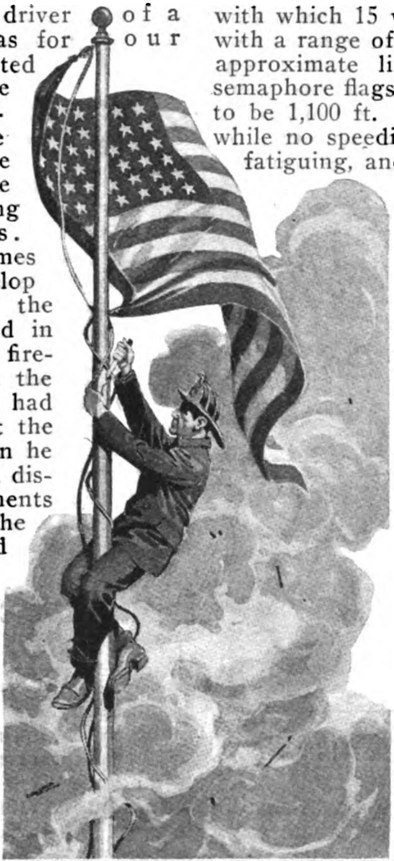
This Heroic-Size Reproduction of "Washington Crossing the Delaware" Is One of a Series of Famous Art Studies Presented at a Buffalo, New York, Movie House

POTATOES SAVED FROM FROST BY USE OF SMOKE SCREEN

Threatened with the loss by freezing of his 20-acre crop of late potatoes, an enterprising Ohio farmer last fall saved the entire lot by the ingenious use of a smoke screen. Because of dry weather in July and August, the potatoes had made very little growth. They were just beginning to mature nicely when the temperature took a sudden drop in September. In anticipation of just such an emergency, however, baled straw had been placed in the most advantageous spots in the field, and fires were started at 10:30 at night. It was found that a much heavier smoke could be produced by the use of wet straw, and this was employed after the flame had been applied. Fires were kept going all night, and the next morning the success of the experiment was assured when it was found that the potatoes were still green while other vegetation, not covered by the smoke, had been destroyed. Approximately 10 tons of straw were used in this fight against nature.

FIREMAN'S CLIMB SAVES FLAG ABOVE BURNING BUILDING

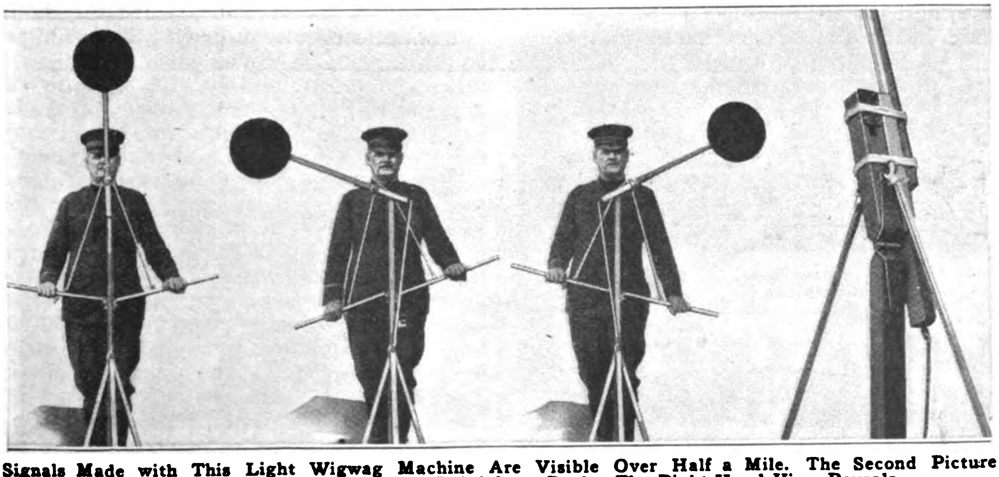
The regard which the driver of a New York fire truck has for our national emblem prompted him, on arriving at the scene of a recent fire, hurriedly to break into the burning building and grope his way to the roof, where stood a tall flagstaff flying the Stars and Stripes. Though the smoke and flames at times seemed to envelop the base of the pole, the breathless crowd gathered in the street below saw the fireman climb the staff, cut the ropes which the wind had badly tangled, and thrust the flag under his coat. Then he slid down to the roof and disappeared. A few moments later he emerged from the building unharmed and took his place at his truck.



Through Smoke and Flame a New York Fireman Scaled the Flagpole on the Roof of a Tall Burning Building and Rescued Old Glory

WIGWAG SIGNALING MACHINE INCREASES VISIBILITY

Experiments conducted by a Signal Corps officer with disks of various sizes as a substitute for the semaphore flags used in wigwag signaling, demonstrate that greater visibility is attained with the disks. A simple machine was devised for manipulating a 12-in. disk, with which 15 words a minute were sent with a range of visibility of 3,000 ft. The approximate limit of clear reading of semaphore flags with the naked eye seems to be 1,100 ft. The machine movements, while no speedier, are more regular, less fatiguing, and less apt to be obscured. The disk of cloth and wire is black on one side and white on the other, selection depending on the background. The disk arm is held normally vertical by a spring, and moved to the right, for dots, or the left, for dashes, by depressing one handle or the other. The whole device weighs less than five pounds, and could readily be made long enough for trench use.



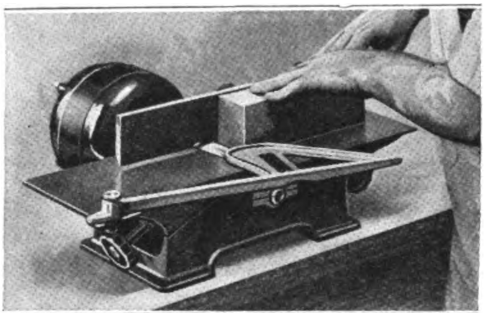
Signals Made with This Light Wigwag Machine Are Visible Over Half a Mile. The Second Picture Indicates the Movement for a Dot, the Third for a Dash. The Right-Hand View Reveals the Simplicity of the Hinged Arm with Its Spring and Cords

NEW DOUBLE-DECK SANITARY CAR FOR SHIPPING HOGS

In an attempt to prevent as far as possible the spreading of infectious diseases to other animals, two double-decked cars for the conveyance of pigs have recently been designed in Europe. Sheet iron is fixed to the ribs of the wagon to a height of about 20 inches above the floor, and the sliding doors are made water-tight. The floors are drained to a gutter in the middle, permitting all refuse to enter two closed iron containers below the floor of the cars. One type of car is fitted with removable flooring, while the floor of the other is a part of the structure. The troughs may be filled through external hinged doors, one door for each trough.

PORTABLE WOOD-PLANING TOOL ELECTRICALLY OPERATED

Something between the hand plane and the big stationary joiner is useful for cabinetwork and pattern making. A small, light, electrically driven bench plane will supply the need. The tool may be equipped with either alternating or direct-current motor. For direct-current use, the machine has a two-blade cutter head, and for alternating current a three-blade head; the reason being that only 3,600 r. p. m. can be attained with 60-cycle alternating current, while the two-blade plane requires about 4,000 r. p. m. An automatic safety guard keeps the blades covered at all times.

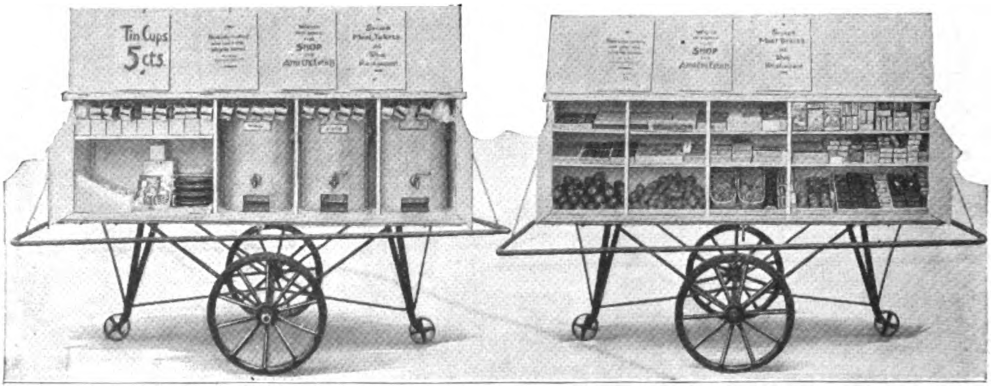

Portable Bench Plane Run by a Small Electric Motor: An Automatic Safety Guard Protects the Blades at All Times

ELECTRIC-METER SUBSTITUTE SAVES TIME AND EXPENSE

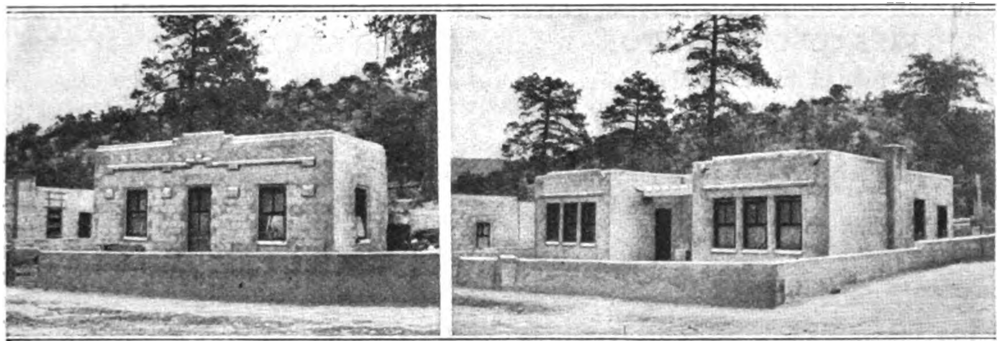
With the object of eliminating the direct-current meter used by small consumers, and the attendant meter reading and bill calculating every month, a Chicago inventor has developed an electrolytic metering can, said to be distinct from any earlier device of the kind. It is designed automatically to open the circuit and to cut off the service as soon as a specified amount has been used. The measurement is accomplished by the action of a small shunt current on an anode, which is gradually consumed while current is being used. When this anode is completely consumed, the main circuit opens, and the service is cut off.

PORTABLE COMMISSARY TAKES FOOD TO SHOP WORKERS

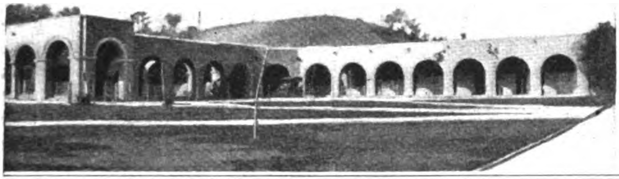
Now even "Apple Mary" and "John the Fruit Man" are threatened with displacement by labor-saving machinery. A big Wisconsin factory has installed a traveling commissary in the form of a truck with compartments for all manner of delicacies. One side has tanks full of hot coffee, milk, and tea; the other side carries in plain sight apples, pears, grapes, chocolate bars, and all the other customary treats of the worker. The raised cover serves as a bulletin board for shop and athletic events.

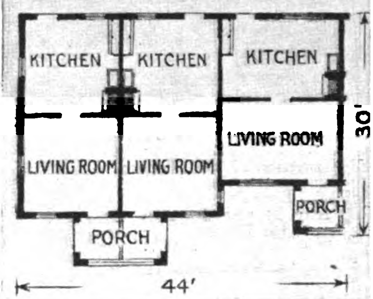


Hot Coffee, Tea, and Milk are Served on One Side of This Portable Commissary, and Fruit and Other Delicacies on the Other. Every Noon It Makes the Rounds of a Big Wisconsin Factory



Architecture Reminiscent of Old Mexico's Adobe has been Used Intentionally in the Housing of Mexican Laborers in a New Mexico Mining Town, the Material Used, However, Being Concrete, Variously Tinted, and with Modern Improvements Installed. Above Are Two Types of Cottage





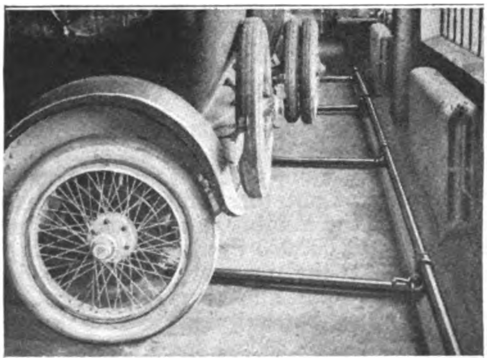
The Long, Low, Romantic-Looking Building Depicted Above Is the Imitation-Adobe Railroad Station at Tyrone, New Mexico. To the Right Is a Typical Floor Plan of One of the Triple Two-Room Houses Whose Homelike Atmosphere has Kept the Labor Turnover Low

ADOPT ADOBE ARCHITECTURE FOR NEW MEXICO HOMES

Stories of Old Mexico and the states that border on the Rio Grande abound in references to and descriptions of the adobe huts and mansions of that romantic region. It is a fact that, without the adobe feature in his landscape, the Mexican laborer suffers from a nostalgia that impedes his productiveness. That is the main reason why those who faced a labor-housing problem in the mining town of Tyrone, N. M., selected the boxlike architecture of the old Spanish settlements for their model. Cement was found to create a permanent substitute for dried mud, with satisfying fidelity to the original. Of course the primitive fitments were discarded, and the little homes have the gas ranges, electric lights, and water and sewer connections of a modern apartment. Window and door arrangements also have been given a civilized touch. The cement, laid on a wood frame, is tinted in pinks, blues, grays, and tans, in true Spanish style. The delight of the Mexican laborers in dwellings that do not disturb their traditions has kept down the labor turnover in the town, and the women take kindly to the conveniences.

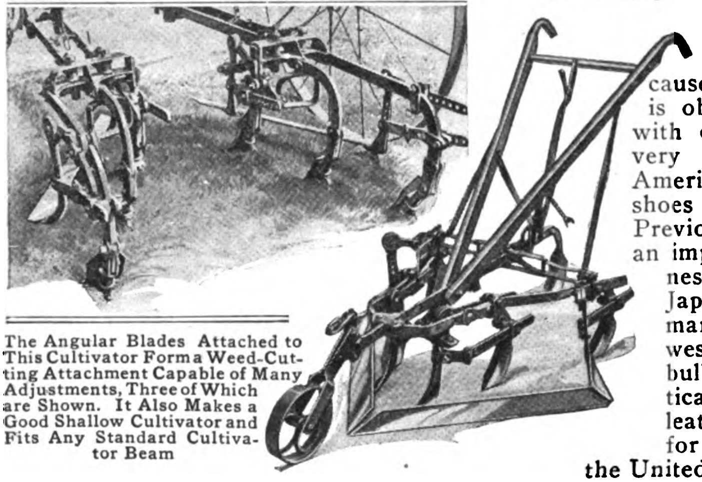
PIPES CARRY MOTOR EXHAUST GASES OUTDOORS FROM AUTOS

In a mid-western branch factory of a motor-car company, a pipe system has been installed to carry off the exhaust fumes when engines are operated indoors. A long pipe is supplied with several laterals which are connected to the exhaust pipes of the cars by means of flexible couplings. The arrangement is one that might easily be adapted in almost any private or public garage.



The Exhaust Gases of the Motor-Car Engines are Carried Out of the Plant by the Piping That Extends along the Floor

WEED-CUTTER ATTACHMENT FITS ON CULTIVATOR



The Angular Blades Attached to This Cultivator Form a Weed-Cutting Attachment Capable of Many Adjustments, Three of Which are Shown. It Also Makes a Good Shallow Cultivator and Fits Any Standard Cultivator Beam

Weeds turned back by the shovels of an ordinary farm cultivator have a habit of straightening themselves up again and continuing to grow. A weed cutter has been designed for attachment to the beam of a cultivator, which may be used either with or without the cultivator shovels, or may even serve in itself as a shovel for the shallow cultivation often practiced in certain seasons. The two long knives of the weed cutter are attached at an angle, which may be varied by adjusting the bolts of the frame. The depth of the cut, or height of the blades in relation to the ground, is also variable. Attached at an angle opposite to that used in cutting weeds, the blades act to roll dirt to the cultivated crop.

FARMING POLICY OF ENGLAND TO BE ALLOTMENT PLAN

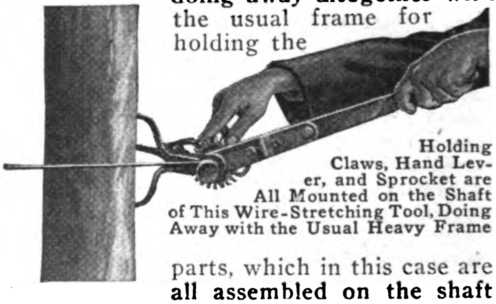
It is to the land-allotment holder that Great Britain is looking for assistance in the food situation, particularly as regards the supply of potatoes, and it is planned to increase the number of allotments from 1,500,000 to 2,000,000 by the next planting season. At the present time there is only about one allotment to every 10 or 12 families, but by taking advantage of a large amount of land that has been growing up in weeds, it is hoped to have this up to one allotment for every five families. There are, even now, several cases where there is a plot for every three, and in one or two cases, every two households.

AMERICAN SHOES ARE POPULAR AMONG ALL CHINESE PEOPLE

According to a report issued by the Department of Commerce, American shoes are in high favor among all classes of Chinese. The average native, however, is unable to secure them because of the high prices, and is obliged to content himself with cloth footgear, or with very poor imitations of the American style of shoe. Leather shoes are only for the wealthy. Previous to the war, Russia was an important factor in the Chinese shoe trade, but since then Japan, which is supplying the market with a shoe made in western style, has secured the bulk of the business. Practically all of the high-grade leather imported into China for use in shoes comes from the United States, while the lasts are made in Japan and are copies of staple American styles.

WIRE-STRETCHING TOOL HAS NO FRAME

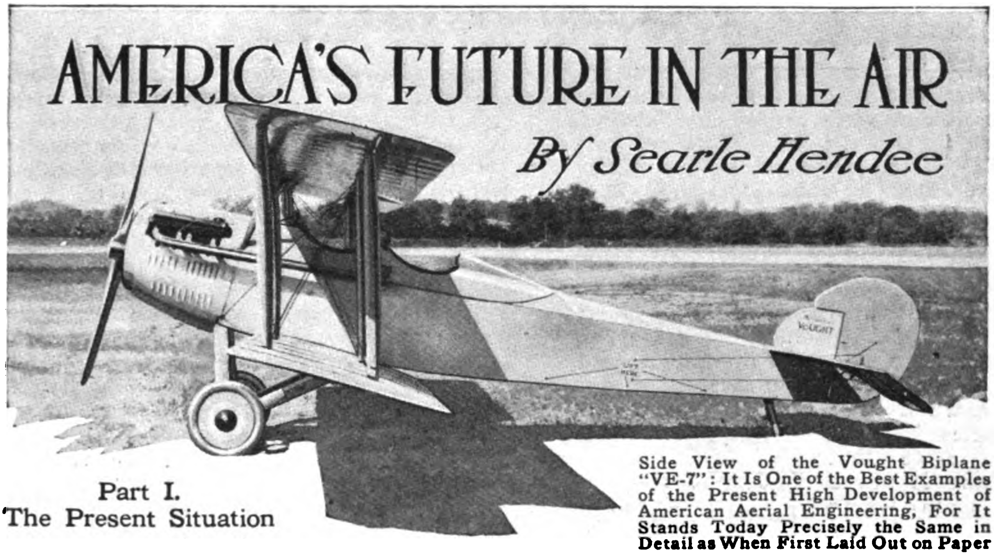
Extreme lightness is attained in a recently designed wire-stretching tool by doing away altogether with the usual frame for holding the parts, which in this case are all assembled on the shaft of the device. The shaft, with its handle and ratchet, is the only moving part. Two iron claws engaging the near side of the post or pole, and one extending around the opposite side, hold the tool in position for use. A gear wheel fixed to the shaft acts as a ratchet, and is turned by a long hand lever with a pawl on it. Another pawl mounted on the shank of the front claws keeps the shaft from turning backward. The cable pulling the wire is wound around the end of the shaft. The compactness and simplicity of the mechanism give it great strength and unusual portability.



Holding Claws, Hand Lever, and Sprocket are All Mounted on the Shaft of This Wire-Stretching Tool, Doing Away with the Usual Heavy Frame

AMERICA'S FUTURE IN THE AIR

By Searle Hendee



Side View of the Vought Biplane "VE-7": It Is One of the Best Examples of the Present High Development of American Aerial Engineering, For It Stands Today Precisely the Same in Detail as When First Laid Out on Paper

Part I.
The Present Situation

Recognized Authorities Tell What They Think of Air Craft's Peace-Time Possibilities

CIVIL aerial transport in the United States, in other words America's aeronautical future, is fraught with great uncertainty.

Despite the fact that numerous plans of a commercial character are being formulated, we are threatened with a dormant period of aerial achievement, as compared with the extreme activity which Europe is expected to experience.

Our problem is not a technical one. We lack but one big thing, and that is a vigorous national policy.

On every hand the question is asked: "Has aerial navigation really a commercial future?" It has, according to competent opinion, but like anything else of new and revolutionary character, it must be developed.

To fully understand the situation that obtains, it is necessary to turn back to the darkest days of the war. America was assigned the task of putting certain types of air craft in quantity production. Machines and motors, thousands of them, were needed to win the war. For the purpose in hand, it was not so important that new types be evolved, as it was that existing models of known ability be built in great quantities with the utmost haste.

The aeroplane industry was organized into the Manufacturers' Aircraft Association and brought under Federal supervision. The foundation of this league is the cross-license agreement, which has enabled manufacturers to exchange ideas and patents on an equitable basis.

War demands in a few months built a $100,000,000 industry that employed 300,000 persons and was devoted almost solely to the production of standard types. It was impossible for manufacturers to find time, and, from the government's standpoint, undesirable for them to take time, to set their engineering staffs at work developing machines for peace-time purposes. Some experimenting, of course, was done, but along military lines. And to this is due the fact that today, although it is not widely known, we have a number of remarkable machines that are without peers anywhere in the world.

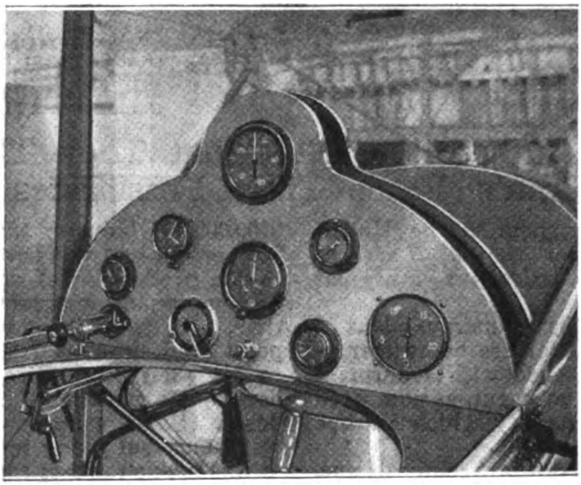
And while we are on the subject, some of these planes may be mentioned. Two of them are craft lately described in this magazine. One is the Glenn L. Martin dual-motored bomber which, in official tests of load-carrying and performance, has surpassed the records of all other machines in America and Europe. Practically every aeronautical authority cites this big biplane as the best in the world, "a flying machine," as Orville Wright says, "that flies like a flying machine." It is one of the few military types now being developed for peace-time uses. The Loening monoplane, with a speed of 150 miles an hour, is another war-time triumph, which, with the Vought "VE-7" advanced-training plane, shown by official tests to be "easily the best" in its particular field, is now coming forth as a sporting and fast express-carrying vehicle.

Because their every energy had been devoted to military work, manufacturers were literally left in mid-air when the armistice was signed. Government contracts amounting to hundreds of millions of dollars were canceled. The industry had no new types of machines designed for passenger and freight transport. Therefore it was unprepared to meet peace-time conditions and take advantage of their possibilities. As this is written, more than three months after the conclusion of actual fighting, the government still maintains control of the air-craft industry. Manufacturers are not wholly free tô go ahead on their own initiative, and the government has taken no step toward a constructive program. Nevertheless it is safe to state that there is not a permanent manufacturer in the country who is not now earnestly engaged, in so far as it is possible under existing circumstances, in devoting his attention to commercial plans for the immediate future.

One of two things is advisable. If the government is to retain control of aeronautics, a definite program must be adopted quickly, enabling the industry to pass safely through the period of several years that will intervene before commercial aviation can be placed on a stable, self-supporting basis. Or else a free rein must be given so that private interests can proceed on their own resources and build aerial-transportation systems step by step as public support is won.

In all of this, and what is to follow, I am merely presenting my interpretation of the views of the recognized aeronautical authorities with whom I have talked. It yet remains to be demonstrated what the aeroplane and the dirigible—now that the industrial production of helium gas makes the latter a practicable vehicle—are really going to accomplish in America. But that aerial navigation has a definite and important peace-time value can no longer be doubted, if faith is to be placed in the opinions of men in the industry, and the history of transportation used as a basis for analyzing future progress.

In this connection it is eminently worth while to see what was going on elsewhere while we were bending every effort to the successful prosecution of the war. On May 22, 1917, when the very existence of the empire was in the balance, the British government formed an imperial commission known as the Parliamentary Committee on Civil Aerial Transport. Its list of members reads like a "Who's Who in the United Kingdom." It was charged with the duty of determining the feasibility, or, perhaps more correctly, the possibilities, of civil aerial transport after the war. The investigations conducted were based on the scientific, commercial, and industrial aspects of the subject as well as on that of national defense. A few weeks ago the committee's final report was submitted to parliament as a basis for constructive legislation. Two very significant statements embodied in the findings briefly summarize the report and go far toward answering the question with which we are here concerned.



Control Board with Instruments Now Used for the Operation of Aeroplanes: To Him Who Remembers the Early Planes, in Which the Airman Sat in an Outrigger with Only the "Joystick" and the Warping Lever to Help Him, the Board Alone Tells an Eloquent Story of the Development of the Art of Flying

Quoting verbatim:

"(a) Cost what it may, this country [Great Britain] must lead the world in civil aerial transport.

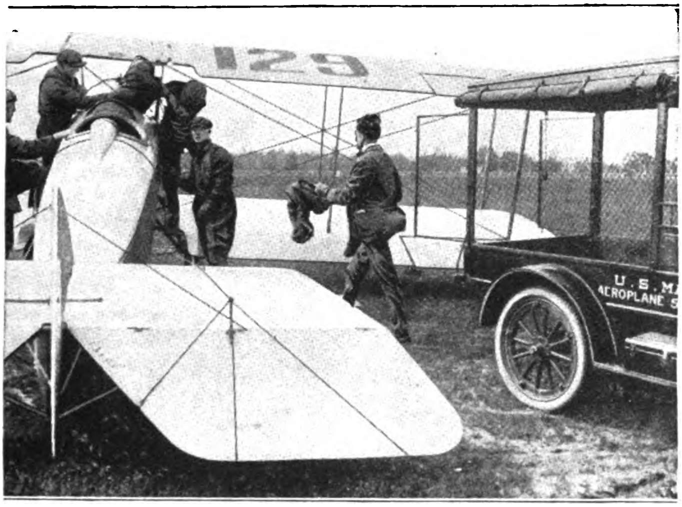
"(b) The State must have a reservoir of aerial power capable of meeting a sudden demand for expansion of the naval and military air forces."

What more conclusive evidence is needed to convince one that at least there is more to peace-time aviation than the county-fair exhibition flights of pre-war days? To British students of the question—and they are cited because they have delved more deeply into the subject than Americans—the commercial value of air travel is so great that "cost what it may," aerial supremacy is a national necessity. Which means, if explanation be needed, that, as with its great merchant marine in the past, the sun must never set on Great Britain's air lanes—they must encircle the globe. Furthermore, it is an admission that henceforth "splendid isolation" is nonexistent and that aerial superiority must serve as naval supremacy has in the past.

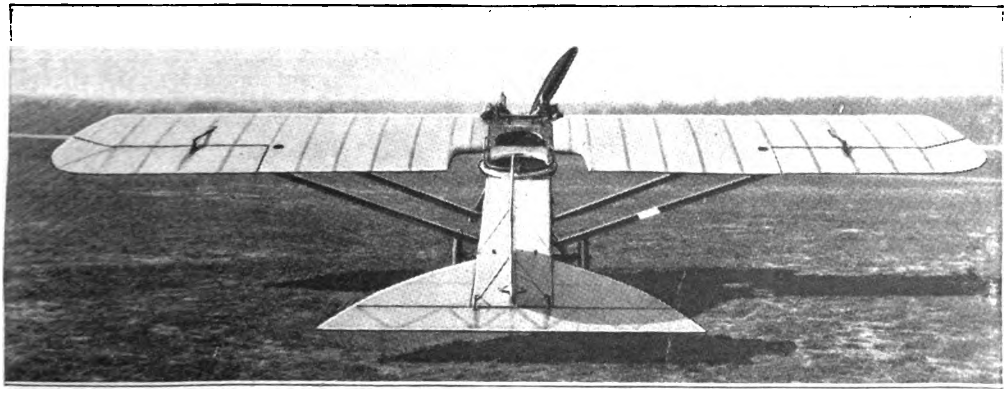
The aeroplane is America's by right of discovery, but, in the opinion of competent judges, America must act, and do so quickly, if she is to reap her rightful measure of profit in its use. To illustrate what is meant, consider the telephone. It is a native invention and has benefited the American people more than those of other nations solely for the reason that it has been utilized more widely here than elsewhere.

This suggests a number of pertinent questions. What, for instance, are the benefits to be derived by aerial transport? What can air craft do that cannot be done more cheaply and satisfactorily by other mediums of transportation? Can they be considered reliable vehicles, when adverse weather conditions, motor limitations, and a thousand and one other things are involved?

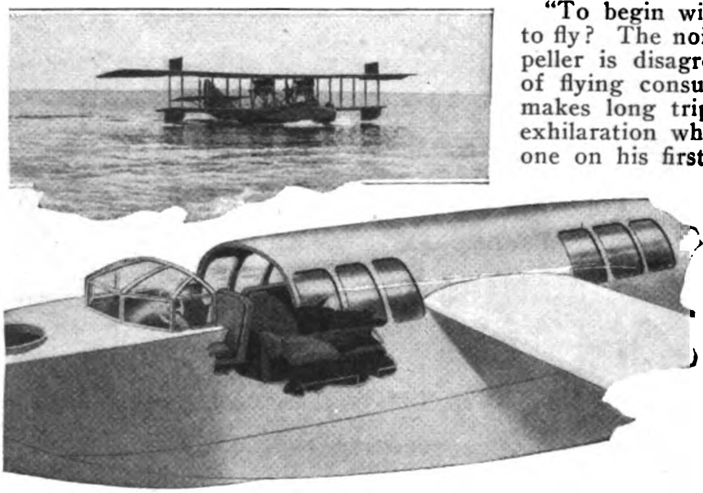
These questions are not difficult to answer. First of all, the aeroplane is king of speed. That, and its ability to travel a straight course between given places and thereby reduce mileage, are its great points of merit. Its commercial success does not depend so much on its ability to handle a large load as it does on the speed with which it delivers a small and important one. As for reliability, we have some interesting statistics compiled by the Division of Aerial Mail Service of the Post Office Department. Mail planes operating between New York, Washington, and Philadelphia during a recent month had 104 scheduled flights, representing a total mileage of 11,336, to make. Only on two occasions were forced land-



The Aerial Mail Service, While at Present More or Less in an Experimental Stage, Nevertheless Has Some Promising Records to Its Credit and Undoubtedly will Become a Permanent Institution, When the Problems of Machines Specially Built for the Service, and of Routes and Landing Fields, have been Solved. Here is Seen an Airplane Taking On Mail from a Postal Motor Truck



The Celebrated Loening Monoplane, a Notable American Achievement of Recent Date, Viewed from the Rear: It Mounts a 300-Horsepower Hispano-Suiza Motor, and in a Government Test, with Three Passengers and Full Load of Fuel and Oil, has Attained a Speed of 150 Miles an Hour, While Its Landing Speed can be Reduced to Only 48 Miles ings necessitated. One hundred and two nonstop trips, covering 11,118 miles, were completed. And in presenting these figures it is only fair to call attention to the fact that the mail planes now in use cannot strictly be considered the best that can be built at this time.



Above is Shown the New Curtiss Flying Boat "H-16," Which, with a Power Equipment of Two Liberty Motors, Makes 95 Miles an Hour and can Carry a Load of Nearly 1,900 Pounds in Passengers and Crew. It is Designed as a Peace-Time Air Cruiser. Its Passenger Cabin, as Seen Below, is Comfortably Sheltered and Has Ample Window Space for Sight-Seeing. Note Also the Windshield in Front of the Pilot's Seat

In wintertime, the aeroplane is perhaps more dependable than railway trains, for the snowstorms that delay and often block the latter are not likely to interfere seriously with aerial transportation. The aeroplane can rise above any ordinary storm, so that rain, sleet, and snow do not affect it. This disregards, of course, the present hazard of landing in fog or blinding snow. Likewise a cyclone—not often to be encountered—is as dangerous for an aeroplane as it is for anything else that gets in its path.

Grover Cleveland Loening, designer of the famous Loening monoplane, has interesting views regarding the utility of the aeroplane. He is one of the most unprejudiced critics I have found and attacks the question in a straightforward, almost brutally frank, way. Here is what he has to say:

"The commercial possibilities of flying and the means of developing them can be translated into terms of level-headed business because we now have definite knowledge on which to base mature judgment. To be successful commercially, the aeroplane must be made to offer distinct advantages that are not to be obtained by other means, and these must be so great that the disadvantages of expense, danger, and uncertainty are overwhelmingly outweighed. To ignore the limitations we know to exist, is to invite loss of public confidence.

"To begin with, is it really a pleasure to fly? The noise of the engine and propeller is disagreeable. The very nature of flying consumes nervous energy and makes long trips tedious. The buoyant exhilaration which is expected by everyone on his first trip, is absent. No one enjoys being bundled and goggled, and it is not a pleasure to have conversation restricted to the use of phones. On the other hand we have the pleasure of marvelous views and the feeling of mastery. Many of the features of flying which are undeniably disagreeable will be overcome by the provision of closed-in bodies—and these we will find in new types of peace-time aeroplanes. But while some persons find pleasure in merely flying around a field, it is far from proved that this is sufficient in itself to make aviation a great universal sport. Something more than this is needed—a feature of utility that will make the physical phases of flying secondary. Deafening noise, crowded cars, foul air, and blank walls make New York's subways admittedly disagreeable. Yet thousands upon thousands of persons use the subways rather than motor cars because of their great utility—quick, direct transportation.

"To consider another phase: The aeroplane and the motor car are not competitors, for the present at least. The aeroplane, for short hauls, cannot hope to cope with the automobile that can stop at any curbstone. But when distances greater than 50 or 60 miles are involved, the latter vehicle ceases to show great advantage. Right here is where the aeroplane steps in, but as a competitor of railway and boat transportation.

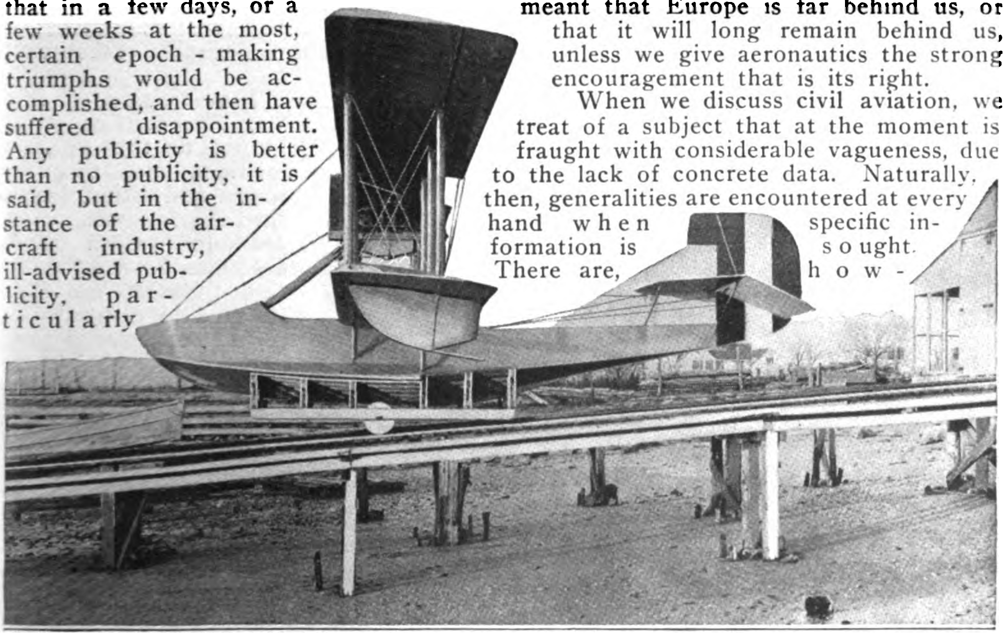
"Undeniably, in terms of miles per hour of actual travel, neither the train nor the ship can approach the air craft. Yet there enters another element that must be considered. It is the time consumption between office and office, we will say, that is important. The office-door interval must include motor-car trips to and from airdromes, which for some time, no doubt, *will* represent greater distances than taxi rides to and from railway stations. Thus at once commercial aviation faces a curious situation—the speed of travel by air is more important now than it will be in years to come. It is needed at the outset to give aerial transportation a sound utility so advantageous that people will ride in the aeroplane, not because of novelty or sensation, but because it is so overwhelmingly the fastest and most direct means of transportation that the elements of high cost and danger are wholly discounted. When we can offer this, a commercial era as great as railroading will unfold itself."

There is one thing that the public and particularly business men upon whose support commercial aviation depends, should know, even though it bares the family skeleton in the closet of America's aeronautical chambers. The desire for personal publicity in circles really outside of the industry itself, has been a serious menace. The public has been grossly misled and has gained exceedingly unfortunate ideas of aviation. Again and again encouragement has been given, in what the public has believed to be "high circles," to rainbow projects utterly impossible of accomplishment at the time, and known to be so by those fostering them. People have been led to believe that in a few days, or a few weeks at the most, certain epoch-making triumphs would be accomplished, and then have suffered disappointment. Any publicity is better than no publicity, it is said, but in the instance of the aircraft industry, ill-advised publicity, particularly before the war, but even now in evidence, has created the popular impression that aviation is a "flighty" thing and that commercial aviation is indeed highly visionary. Men like Orville Wright, Grover Cleveland Loening, Harold Talbott, Jr., Chance Vought, and others of similar high standing, are unanimous in their condemnation of the practice, and most cognizant of the great injury it has worked.

Mr. Wright, who is renowned for his conservatism, feels that the public has grown to overestimate both the danger of flying and the abilities of modern aeroplanes. On the other hand, Mr. Loening believes that thinking people have so long been fooled that they now really underestimate the capacity of flying craft.

There is still another angle that is interesting. Censorship, on the one side, and foreign propaganda, on the other, have made it appear that Europe, and especially England and Italy, possesses the greatest air craft in existence. Nothing could be farther from the truth. In bombing, fighting, and training planes, American-designed, motored, and built, we have the superlative in present-day achievement, and at least the foundation on which to build passenger and freight-carrying ships of equal, if not superior, greatness. By this, however, it is not meant that Europe is far behind us, or that it will long remain behind us, unless we give aeronautics the strong encouragement that is its right.

When we discuss civil aviation, we treat of a subject that at the moment is fraught with considerable vagueness, due to the lack of concrete data. Naturally, then, generalities are encountered at every hand when specific information is sought. There are, how-



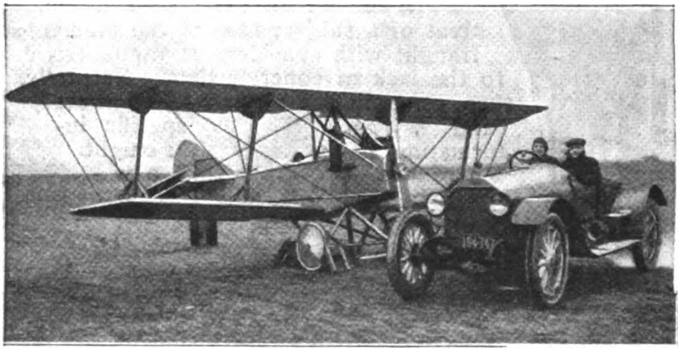
Isolated Instances of the Use of Aeroplanes and Flying Boats for Sporting Purposes have Come to Notice Now and Then in the Past. Here, However, Is a Craft Specially Designed for the Sportsman. It Is the Curtiss Flying Boat "MF," Built for Two, and Has a Speed of a Mile a Minute ever, a number of elements which form a substantial basis for reasoning. After all, one could hope for no more at this time than the opinions of reliable authorities.

One thing that has an immediate and important bearing on civil aerial transport is the landing station. Before aviation can reach any noteworthy state of peace-time development, airdromes are needed. Although we have planes that travel at thrice the speed of railway trains, their usefulness is limited by the lack of proper landing facilities. Moreover, safety is likewise involved. Orville Wright, whose opinion is shared by others, contends that aeroplanes must either have a very low landing speed—say, 20 or 25 miles an hour—or there must be frequent alighting places provided for them. With both low landing speed and frequent well-constructed landing fields, of course, we would approach the ideal condition. But in America, at the present time, we have neither of these advantages, although it is true that our engineers are getting wider speed ranges than ever before and, therefore, lower landing speeds than have been common in fast machines.

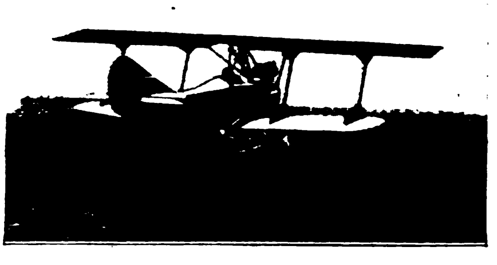
The country as a whole seems to be awakening to the importance of establishing airdromes, and commendable activity is being shown. Towns, for instance, that one has never heard of before, are inquiring what they should do. And when a moment's thought is given to the subject, it is not surprising that out-of-the-way points, extremely desirous of better lines of communication with the outside world, should be among the first to encourage development of the aerial transport. The difficulty, however, is that so far the "commendable activity" has produced few concrete results—that is, actual fields.

In speaking of landing fields, Mr. Wright, in brief, says: "To make flying perfectly safe, good landing fields should be established at 10 or 15-mile intervals. When this is done, the greatest obstacle in the path of aviation will have been overcome. Flying at a height of a mile, one can glide six or eight miles in any direction without power. Thus, when there are frequent, well-marked landing fields, motor trouble necessitating a forced landing will occasion no peril. And I might say that the aeroplane of today is an abundantly safe vehicle.

"Because of the great expense involved in the establishment and maintenance of fields, adequate in number, size, and condition for widespread flying, it seems that aeroplanes must be built for existing conditions rather than for ideal ones. Take, for example, the motor car. It became a practicable vehicle of great utility when it was built to negotiate whatever sort of roads were to be encountered. Its universal adoption has forced the construction of better highways, until today in every part of the United States, the good-road issue is a live one. The same condition governs the aeroplane. It must be built to alight safely wherever there is an open space. With its increasing use will come airdromes and the desirable emergency-landing fields."



Two Views of a New American Biplane, Designed for Civilian Use, That is Expected to be Sold through Motor-Car Dealers for $2,500: Strictly, However, It Is Still in an Experimental Stage at Least So Far as the Public is Concerned and Has Yet to Prove Its Worth

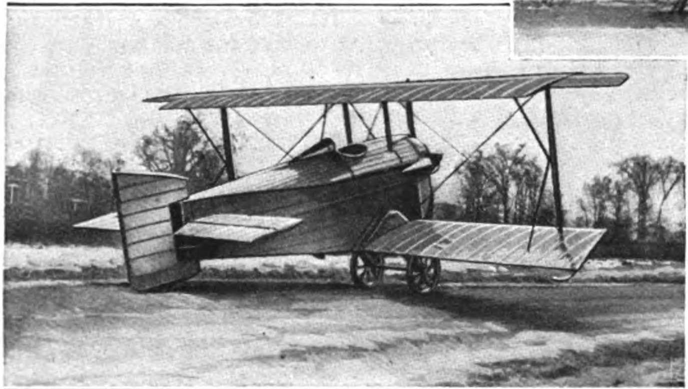


The Division of Military Aeronautics, in response to the flood of inquiries emanating from towns and cities, has issued the following memorandum, which briefly describes how a landing field should be constructed in order to encourage civil aerial transport.

"The landing field should, if possible, be from 1,500 to 2,000 ft. on a side. This would afford a four-way field permitting landing from any direction. If there are no high obstacles along the borders, such as buildings, trees, wires, etc., a somewhat smaller field could be used, possibly as small as 1,200 feet square. Consideration should also be given as to whether or not building construction in the future may encroach upon the approaches to the field.

"The soil should, if possible, be light and porous, with natural drainage. The surface should be level and smooth, covered by a firm sod. It is especially important that the nature of the soil should not be such as to become soft in wet weather.

"The location should be near transportation facilities, such as good roads, car lines, etc.; the closer to the center of town, the better.

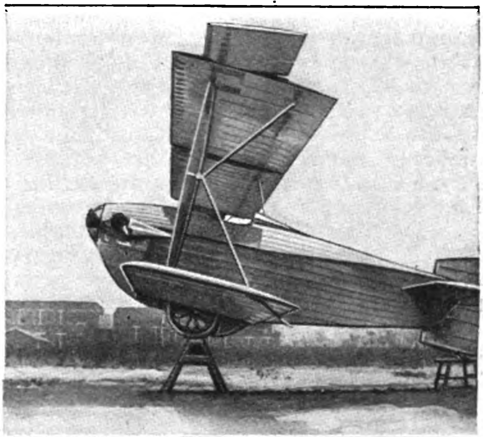


The Attempt to Evolve a Cheap Plane of Low Operating Cost for Sporting Purposes Is an Interesting Step, but That Is All That can be Said for It at This Time. Here Is a $2,000 Craft That Weighs Only 350 Pounds and Has Some Odd Characteristics. The Lower Wing Span Is Greater Than the Upper, the Landing Chassis may be Drawn into the Body, and the "K"-Bracing Is Distinctive. The Latter Two Features Are Attempts to Reduce Resistance

"The field should be marked conspicuously so that it can be easily located from the air. A large whitewashed circle, with a letter in the center, designating the name of the town, is a suggestion along that line.

"Instructions should be posted at the field indicating proper steps to be taken to obtain high-test gasoline and oil most expeditiously. It is most important that high-test airplane gasoline be obtainable. These instructions should also give information covering possible arrangements for guarding machines.

"At the present time these fields must necessarily be a municipal proposition, since there is no authority to cover government support or regulation. As regards mechanical equipment, eventually hangars and gas and oil stations, and possibly a rest house for airmen, would be very desirable, but, due to the present status of aviation development, it is not thought advisable to start any such elaborate program, unless the field concerned were on a regularly established aerial route."



The Picture Above Gives a Side View of the "Bluebird," and Well Illustrates the Position of the Landing Chassis When the Craft Is in Flight. In One Respect the Photograph Is Deceiving: The Plane Is Not as High as a Fair-Sized Man

Carrying the question of landing fields, which is a vital one, a step farther, two opinions are expressed. On one hand it is believed that the extension of the aerial mail service will rapidly solve the problem; on the other, that the enterprise should immediately be undertaken by municipalities and individuals, with the assistance of the air-craft industry, and not left to the Federal government.

Night flying will be necessary for the successful prosecution of commercial conquest, and for that reason provision must be made for clearly marking air ports so as to permit safe descent in the dark. Another consideration is the development of some practical means of indicating the positions of alighting stages when they are hidden from view by fog, and of lessening the danger of landing at such times. Star rockets were used during the war for this purpose, and until some better means is devised, they offer a little—although not very encouraging—aid.

Glenn Curtiss, one of the well-known pioneers in American aeronautics, seems firm in the belief that one of the first important developments in commercial aviation will be the use of flying boats and seaplanes for passenger and package-carrying between ocean and lake ports, for the reason that sheltered harbors offer the only "landing fields" that are necessary. In other words, terminal facilities for the flying boat are already provided.

Concerning the use of "land" machines, he cites the provision of airdromes as prerequisite, although at the same time pointing out that in certain parts of the middle West, South, and Pacific-coast regions one can alight almost anywhere without serious difficulty.

"I look for the early development of mail routes, the use of aeroplanes for coast-guard patrol, forest survey, life-saving, harbor patrol, and general passenger and freight carrying," Mr. Curtiss asserts. "It probably will be two or three years before commercial aviation will be developed sufficiently for the industry to stand on its own feet, however."

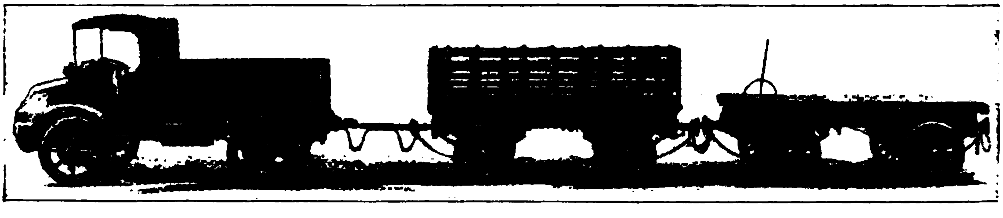
And this introduces the reason that many men in the industry—among them Harry Bowers Mingle, president of the Standard Aircraft Corporation; Glenn L. Martin, Chance M. Vought, and others—feel that government subsidy, or at least Federal coöperative support of the thoroughgoing sort, should be extended at this time to carry aviation successfully through the transition period it is now entering. In establishing civil aerial transport, the problem is not greatly unlike that of projecting a modern railway line through new, undeveloped country sparsely settled with people who have previously depended on other and slower mediums of transportation and at the outset are slow to accept an innovation and use it. Every one agrees that the public has yet to be converted to aviation.

(To be continued)

AIR BRAKES FOR TRUCK-AND-TRAILER TRAINS

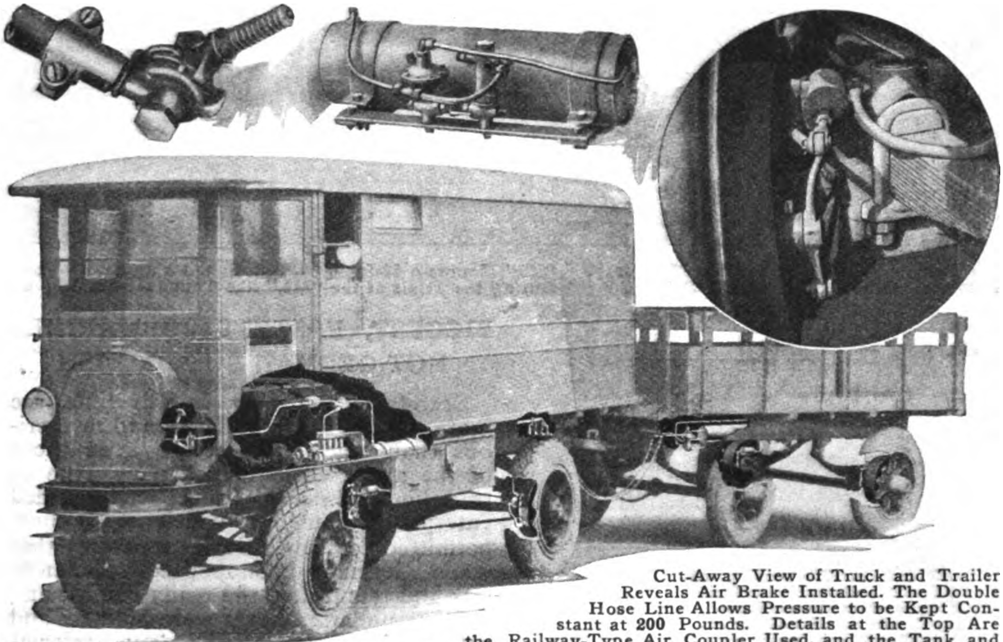
So long as the truck and trailer are operated at eight or ten miles per hour on good roads and in level country, the necessity of air brakes or, in fact, any brakes, on the trailer is not great. But when powerful engines are used in the truck so as to pull a trailer train over the mountains of Pennsylvania, grades are encountered which require the use of brakes on the trailers as well as on the truck. If, in addition, the trucks and trailers are provided with giant pneumatic tires, it is possible to operate the trucks at higher speeds than is customary. Twenty-five miles per hour is a good average road speed for such a train. As compared with speeds mentioned above, from six to nine times as much work has to be done by the brakes in stopping a truck running at 25 miles per hour. It is obvious that the brakes provided on the truck are not equal to such an overload and additional brakes are necessary.

Not only must additional brakes be provided, but, unless the brakes on the trailers are applied simultaneously, there is going to be dangerous skidding of the trailers. On a greasy pavement, or a hill, the trailer will try to whip sidewise and pass the truck that is towing it, if the speed of the latter is reduced by the application of brakes. As a universally jointed drawbar has to be provided between the trailer and the truck, it is obvious that such a bar will not prevent the trailer from whipping or skidding if the resisting force is applied at its end. It would be just like trying to balance a 10-ton load on the end of a broomstick. Although the use of brakes on the trailer is granted,



Truck-and-Trailer Train Equipped with Air Brakes: The Double Air-Line Connections of Rubber Hose Are Visible between the Vehicles. So Equipped, and with Large Pneumatic Tires on the Trailers, a Train can Average 25 Miles an Hour in Hilly Country

the method of operating them is a problem.



Cut-Away View of Truck and Trailer Reveals Air Brake Installed. The Double Hose Line Allows Pressure to be Kept Constant at 200 Pounds. Details at the Top Are the Railway-Type Air Coupler Used, and the Tank and Valve for Each Trailer. In the Circle Is the Trailer Air Brake Itself. For Emergency Use Ordinary Hand-Operated Brakes Are Also Provided

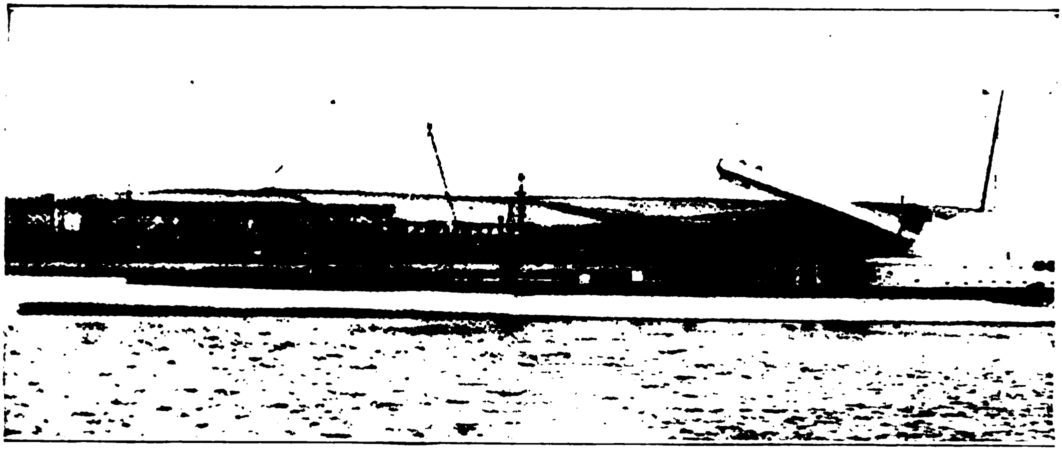
Air brakes have been tried out during the past year, and in the form which they now have, are very practical and satisfactory. Using air brakes gives a very satisfactory and flexible means of connecting up the towing truck with the trailers, as only a few pieces of hose are necessary.

The system herein described consists of the following units: A power-driven air pump which is disconnected as soon as the system reaches 200-lb. air pressure per square inch; an air reservoir on the truck, and one on each of the trailers; a pedal-operated brake valve beside the foot throttle on the truck; a pressure-regulating valve on each of the trailer tanks and an application valve also; the brake cylinders, one of which is applied to each brake, and the two rubber-tube air lines that extend from the truck to each of the trailers.

Two air lines are provided so that one may be utilized to keep the air pressure in each of the trailer reservoirs at the prescribed 200 lb., and the other to regulate the application of the air pressure in the brake cylinders.

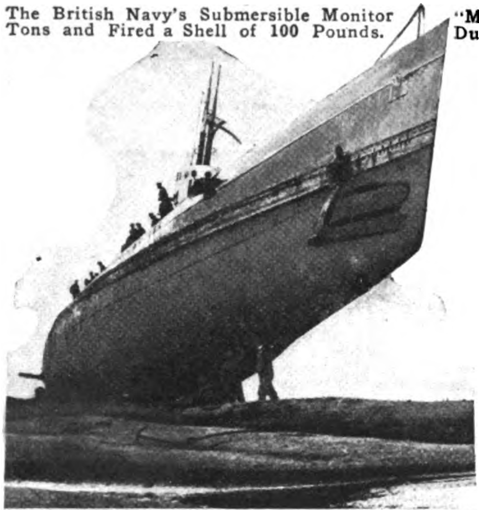
The application is regulated by the position of the foot pedal. The farther the pedal is depressed, the greater the pressure applied on the brakes, and this is maintained until the pressure of the foot is removed from the pedal. The valve is so constructed that as soon as enough pressure—the amount corresponding to the particular position of the valve—has entered the brake cylinders, the admission of further air is automatically cut off without any action or thought on the driver's part. Further depression of the pedal and movement of the valve increases the air pressure in the brake cylinders, and vice versa. This feature, and the use of the double air line, are the most prominent characteristics of the system. One other, however, should be mentioned, the provision to apply the brakes whenever the air lines are broken. Should the trailer hitch break loose on a hill, the brakes would be applied instantly so that there would be no chance of the trailer running amuck. Manually operated brake levers and connections, which in no way interfere with the operation of the air brakes, are also provided.

¶ Daylight-saving day's first anniversary falls on Sunday, March 30, 1919, and all the clocks in the country will be set forward one hour, just as they were last year. They will be set back on Sunday, October 26, unless Congress acts to repeal the measure.



The British Navy's Submersible Monitor
Tons and Fired a Shell of 100 Pounds.

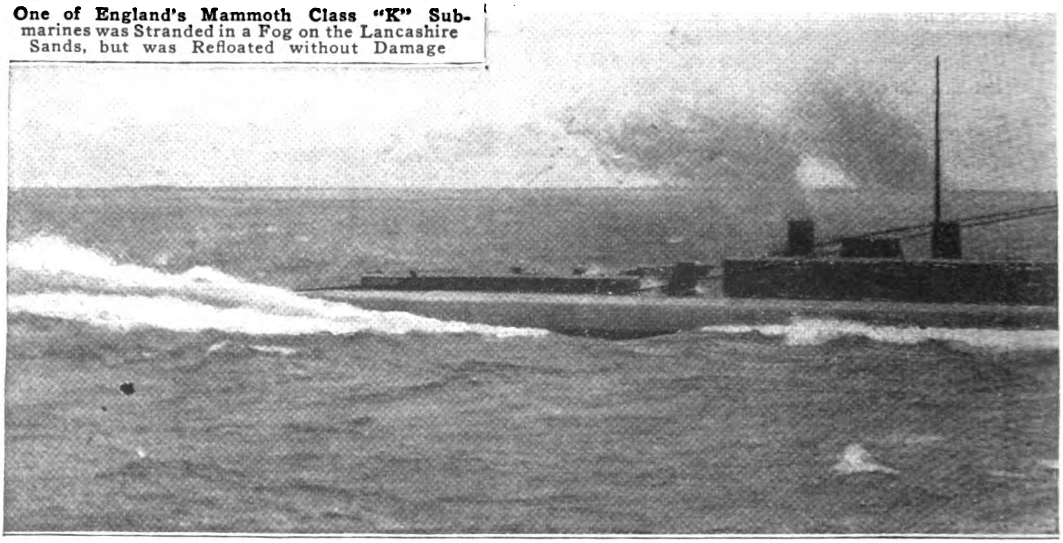
"M1" Mounts a 12-Inch, 50-Ton Gun, Firing an 850-Pound Shell
During the Trials of the "M1," the Sound of Its Big Gun Was



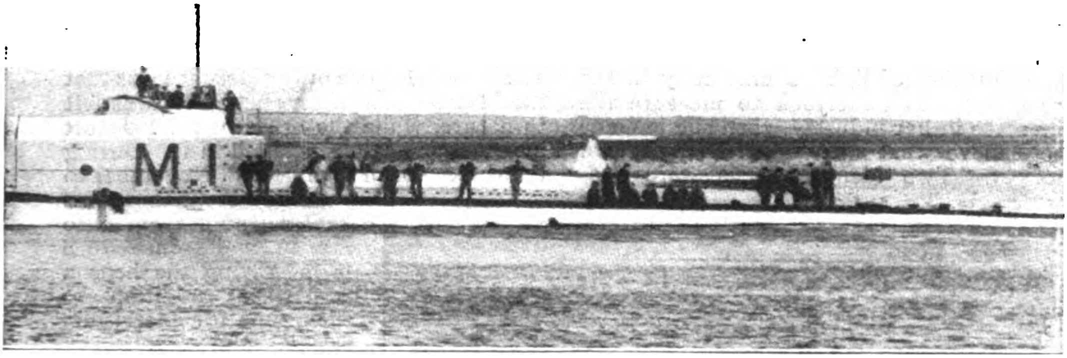
BIGGEST, FASTEST SUBMARINES NOT GERMAN BUT BRITISH

Secrets of the navy, in war time, are more curious and wonderful and mysterious than any other secrets, even those of the army. The British navy, true to tradition, had many of these well-guarded enterprises, some of which it is now permitted to view. So it transpires that while Germany monopolized submarine talk and reputation, the really biggest and swiftest undersea boats were built by and belonged to Great Britain. The performance of these craft, known as class "K," is typified by the "K1," which has a surface speed of 24 miles an hour and a

One of England's Mammoth Class "K" Submarines was Stranded in a Fog on the Lancashire Sands, but was Refloated without Damage



"K1," of the British Navy's New Submarines, the Largest Ever Built by Any Nation: On the Surface It
Makes 10 Miles an Hour. It Is 340 Feet Long, with a Displacement of
Four-Inch Guns, Fore and Aft, Three Anti-Aircraft

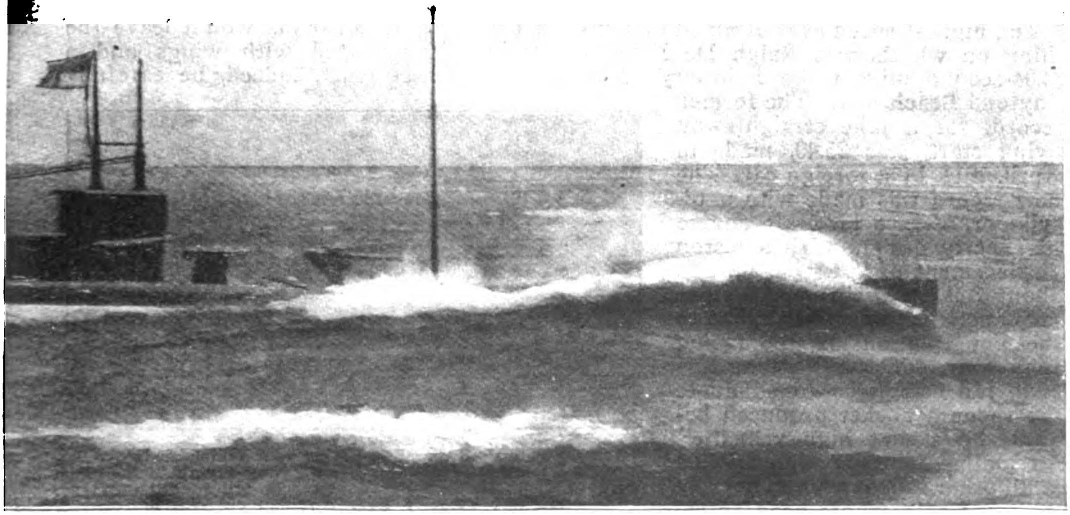


While the Largest Armament Carried by Any German Submarine Was a Six-Inch Gun, Which Weighed But Five Responsible for the Rumor, Prevalent Ashore, That the Isle of Wight was being Bombarded by German Battleships

submerged speed of 10 miles. It is 340 ft. long, with a 2,000-ton displacement on the surface and nearly 3,000 as a diver. Two four-inch guns fore and aft, three anti-aircraft guns, and eight torpedo tubes constitute its armament. On the surface it raises two short funnels out of a deck recess and runs on steam from light water-tube boilers. Submerged, it is electrically driven. The British navy's "M" class is a remarkable type of submersible monitor, armed with a 12-in., 50-ton gun, firing an 850-lb. shell. Both these ships are away beyond anything in submarines attempted by the German navy, and are competent to meet enemy destroyers or even cruisers.

GAS USED TO EXTINGUISH INSULATING-OIL FIRES

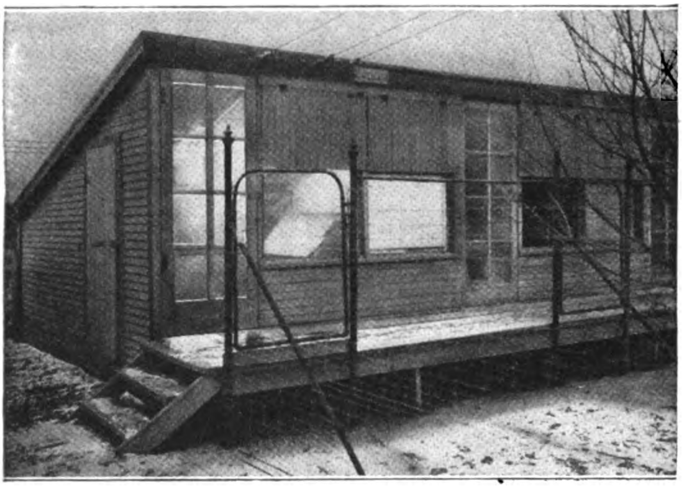
Large central-station transformer cases and switch-gear tanks filled with insulating oil have a certain element of fire risk. A French method of protection proposes to extinguish such fires with nitrogen or carbonic-acid gas. A pipe carrying gas under pressure connects with each oil tank, the end of the pipe being stopped with a fusible plug. Individual gas cylinders for each oil tank may be used. To protect the cable ways from high temperature, hand control is substituted for automatic, the pressure tubes of gas being connected to a large storage tank.



Makes 24 Miles an Hour, Propelled by Steam and Using Oil Fuel. Submerged and Electrically Driven, It About 2,000 and 3,000 Tons, Floating and Diving, Respectively. It Mounts Two Guns Amidships, and Has Eight Torpedo Tubes

ELECTRIC "DAYLIGHT" FOR HENS INCREASES EGG PRODUCT

Since the hen bases her working day on the duration of light, a university in the central states undertook to measure the increase in her industry when she is made to believe that the days have grown longer. Two identical pens were provided, each stocked with 35 single-comb white leghorns. Feeding, housing, and all other conditions were exactly similar for both lots, and hens of equal productiveness selected. The only difference was that the illumination of one henhouse was left to nature, while the other had a 100-watt incandescent lamp installed in it. During the three-month trial period, November to January, the lamp was kept burning from 6 to 7 a. m. and from 4 to 8 p. m., giving the hens a 50-per-cent addition to their time for exercising, eating, and "working." From the unlighted pen 1,082 eggs were taken in the three months; the birds which worked overtime by electric light produced 1,478 eggs in the same period. This gain of 33 dozen eggs, at 63 cents, left a net profit of $15.27 on an investment of $5.52 for electric current. Feed cost was practically no higher for the lighted pen, but it took the hens about two weeks to respond to the artificially lengthened working day.

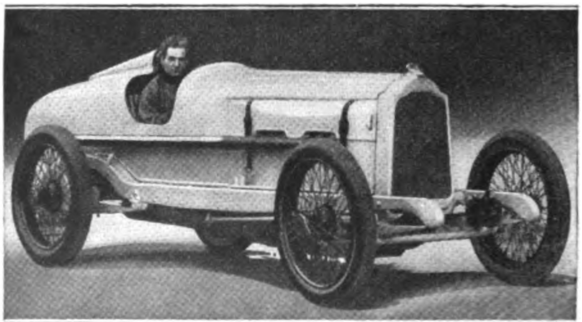


COURTESY PURDUE UNIVERSITY AGRICULTURAL EXPERIMENT STATION

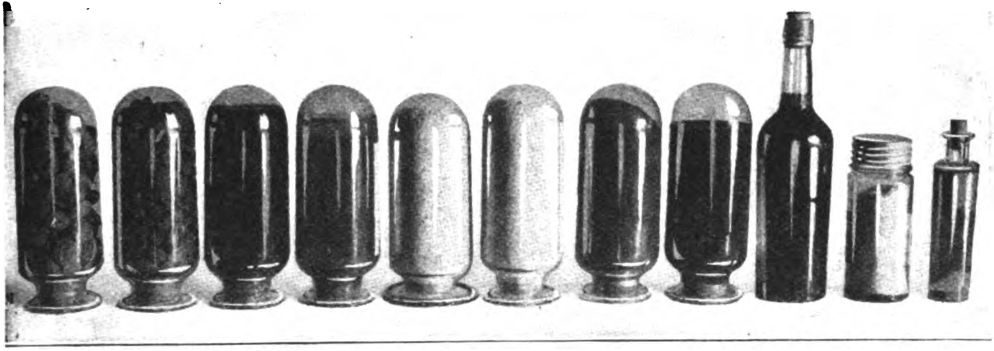
The Henhouse at the Left Has a 100-Watt Lamp Burning from Six to Seven A. M. and from Four to Eight P. M. The One at the Right Has Only Natural Lighting. Hens in the Lighted Pen Laid Nearly 40 Per Cent More Eggs Last Winter Than Their Sisters Next Door

AUTO MAKES FASTEST MILE WITH AIRPLANE MOTOR

The highest speed ever attained by anything on wheels was Ralph De Palma's 24.04-second mile, made February 12 at Daytona Beach, Fla. The former record, for a mile straightaway flying start, was 25.40, made in April, 1911, by a foreign car. The new record was made with a 12-cylinder, V-type air-craft engine of Liberty design, with a piston displacement of 904.8 cu. in. and about 260 hp. Air-craft designing experience was also applied to the construction of the racing car's body, which has a long torpedo tail calculated to eliminate the vacuum pocket produced behind the car at high velocities. Streamline contour was applied to all other salient points, notably the front axle, whose head-on resistance was reduced nearly 100 lb. The figure set means a speed of 149.72 miles an hour. At this terrific rate the best of tires are good for only about 10 miles, and are apt to burst by centrifugal force. Such a car, weiging 3,400 lb., would leave the ground if equipped with wings and a propeller. It must, indeed, be carefully designed to prevent its doing so by its own sheer speed and air surface.



Ralph De Palma's Streamline Racer, with Which He Broke the World's Record for One-Mile Straightaway Flying Start: His Mark of 24.04 Means a Speed of 149.72 Miles an Hour, the Highest Velocity Ever Attained on Wheels



All These Products Come from the Kernels of Apricot Pits. Taken in Order, the Bottles Contain the Pits Themselves, Their Kernels, Apricot Fruit Oil, Bitter Oil of Almonds, Apricot Meal, Apricot Cleanser, American Blue, Prussic Acid, Fruit Oil Ready for the Market, Benzoic Acid, and Essence of Apricot

APRICOT PITS NOW SUPPLY PRODUCTS ONCE IMPORTED

Industrial chemist for the world was a part played by Germany with her usual assurance and air of natural monopoly. One good that is working out of the evil of war is the demonstration that American chemists, under the spur of demand, can readily surpass the accomplishments of German science. California has an annual by-product crop of 7,000 tons of apricot pits, which were formerly sold to Germany and Denmark at $45 a ton. When the war closed this market, and the price dropped to $15, a California chemist bought a supply and started experimenting. He is now able to market apricot fruit oil, a substitute for olive oil; essential oil of apricot, better known as bitter oil of almonds; a meal used in mixture with others for waffles and hot cakes; a finer meal used for cleansing; American blue, formerly known as Prussian blue, from which prussic acid can be made; extract of apricot for flavoring, and a small quantity of benzoic acid. American blue is in large demand for coloring printing inks, paints, etc., and forms the base for a cheap bluing. Bakers' almond paste may be made from the essential oil. The latter has a market value of $10 a pound, while American blue commands $1.65 a pound. A ton of apricot pits yields products valued at over $200.

¶England's old-time institution, the baked-potato man, once more is offering hot sweet potatoes at all hours on London streets. It is said that before the war shortage, chilly pedestrians found a pair of his commodities in the pockets quite effective as finger warmers.

BEE MAN IS NOT TERRIFIED BY BEES IN HIS "BONNET"

While it is well known that experienced bee men do not hesitate to move among and handle bees without special protection of any kind, it is safe to assume that there are comparatively few who would venture to fill a hat with the buzzing creatures and then place the hat on his head, as the veteran bee man shown in the accompanying photograph has often done. It will be observed that the bees are crawling over his clothing and hair in large numbers. This man possesses an enviable immunity to the poison of bee stings, but in order that as few of the insects as possible may sting him, he confuses them by shaking them up badly and giving them a dose of smoke before putting them in his hat.

A Veteran Bee Man Demonstrating That He Has No Fear of Bee Stings: Numbers of the Angry Insects are Flying from His Hat, and Others are Crawling on His Hair and Clothing

FOREIGN PASSENGER-CARRYING AEROPLANES

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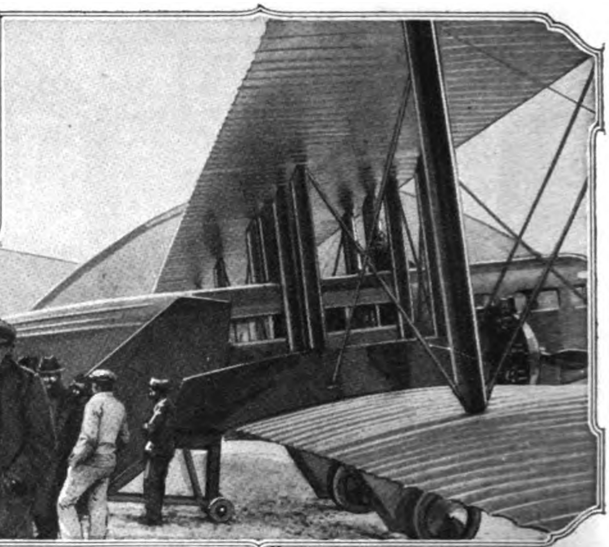
A Glimpse in the 12-Passenger Cabin of the Big Farman Peace-Time Biplane, Pictured at Right and Below



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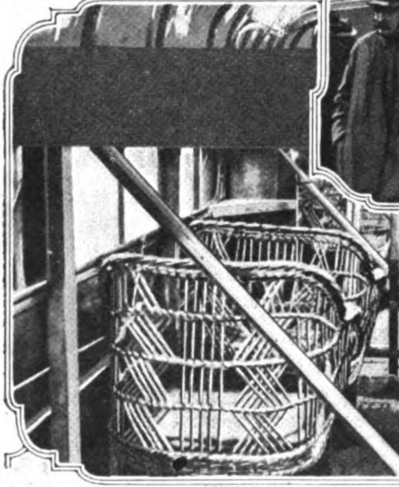
Showing the Inclosed Body of the Farman Two-Motored "Goliath," Developed for London-to-Paris Passenger Service and Used to Carry British Representatives to and from the Peace Conference: The Cabin is Fitted with Wicker Chairs as Pictured at the Left



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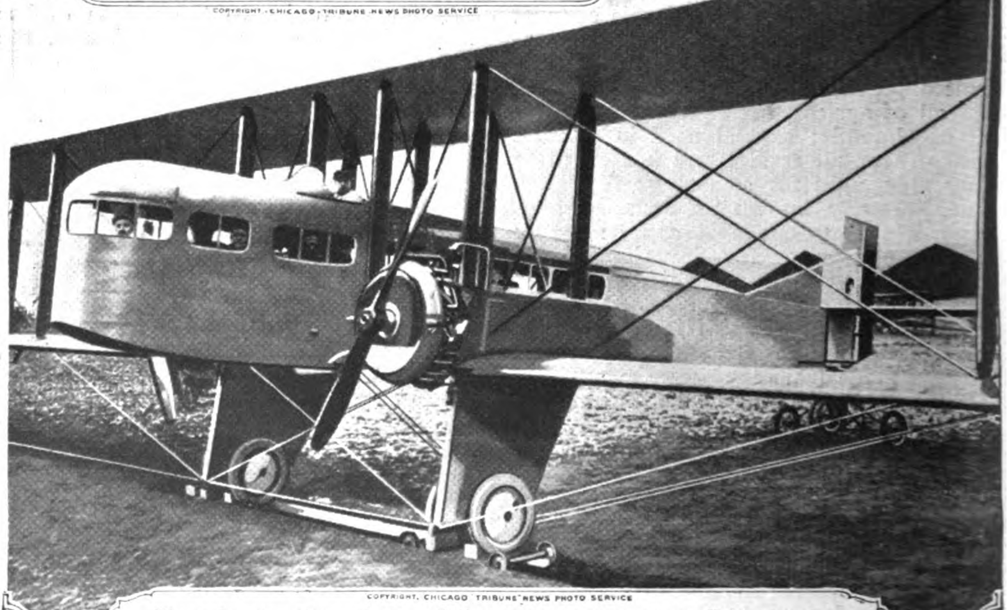

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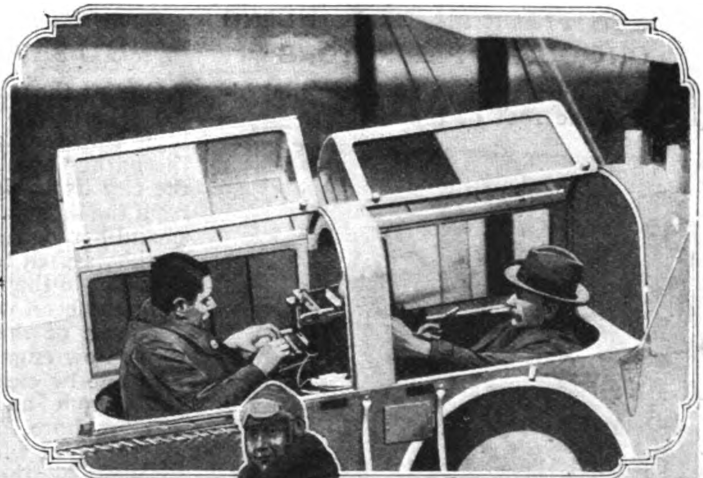
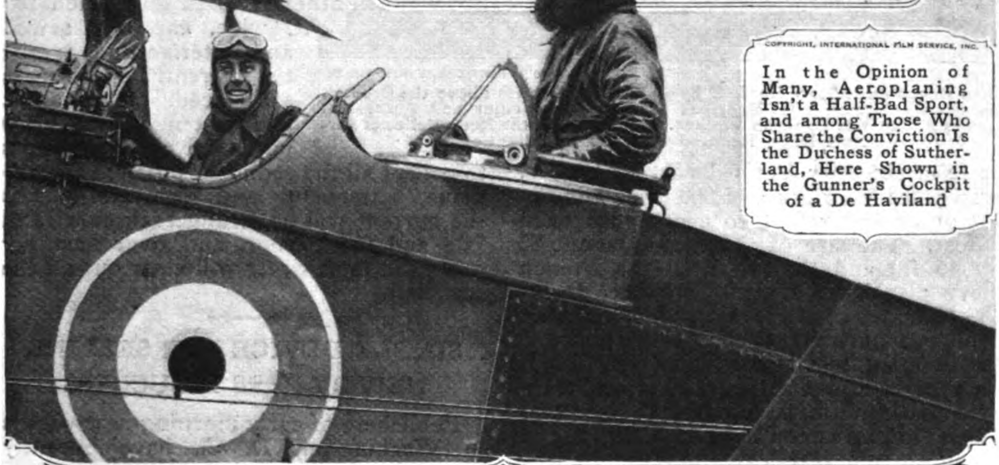
Three-Quarter View of the "Goliath," Interesting as an Example of the Commercial Aeroplane of the Armistice Season: Since This Particular Machine is Apparently Used Only for Official Business, the Word "Commercial" Is Merely a Descriptive Term

INTRODUCE A NEW ERA OF TRANSPORTATION



The Interior of Lloyd George's Inclosed Cross-Channel Aeroplane, with Comfortable, Upholstered Seats for Two, a Writing Table, and a Luggage Compartment Abaft the Pilot's Cockpit

PHOTO BY CENTRAL NEWS PHOTO SERVICE



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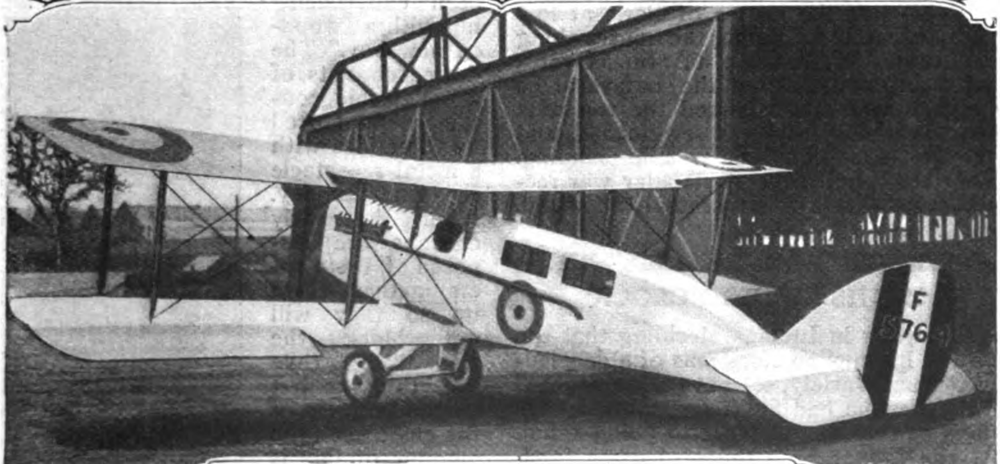
In the Opinion of Many, Aeroplaning Isn't a Half-Bad Sport, and among Those Who Share the Conviction Is the Duchess of Sutherland, Here Shown in the Gunner's Cockpit of a De Haviland



Presenting Premier David Lloyd George's Private Aerial Bus, Which Enables Him to Go from London to the Peace Conference in a Small Fraction of the Time Required by Other Means of Transportation

FRENCH FLIER MAKES LANDING ON ROOF OF PARIS STORE

Successfully landing his Caudron biplane on the roof of the Galleries Lafayette, a six-story Paris department store, won Jules Vedrines a $5,000 prize and the honor of being first to accomplish such a feat. The size of the roof is about 82 by 46 ft., and the width of the French flier's plane was 39 ft. The space inside the parapet had been cushioned with sandbags during the air-raid period, and the landing was made with only slight damage to the machine and none whatever to the airman. Vedrines' flight was made shortly after the noon hour, and in a fog. From Issy les Molineaux he flew straight over the center of Paris at low altitude, barely skimming the houses along the Rue de la Chaussée d'Antin. Over a bank just across from the Lafayette he stopped his engine, missed the top of a sign on the store by a few inches, and quietly made his remarkable landing. Vedrines, who has a spectacular war record, now wishes to fly around the world.

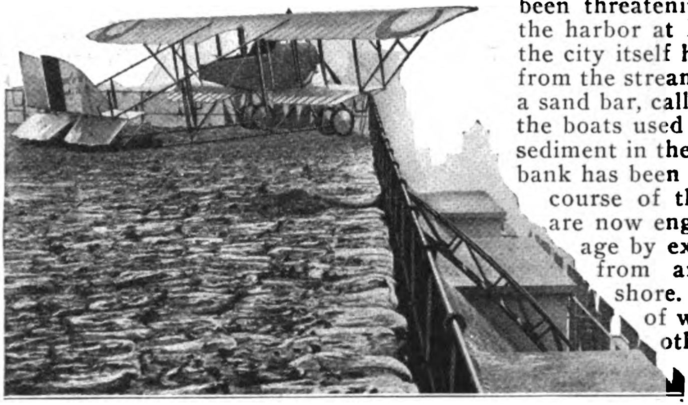


PHOTO BY CENTRAL NEWS PHOTO SERVICE

On a Department-Store Roof, 82 by 46 Feet, Six Stories above the Ground, the French Airman Jules Vedrines Made a Spectacular and Successful Landing with His Caudron Biplane. Sandbags on the Roof, Relics of Air-Raid Days, Reduced the Shock of Alighting

JEWELER "NATURALIZES" BIRD IN HIS CUCKOO CLOCK

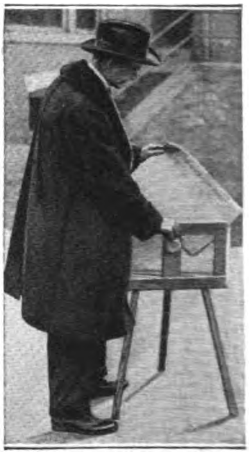
A jeweler in Indiana, deciding that the bird in his cuckoo clock was of a decidedly German variety, set out to "naturalize" it. When he had finished making alterations he set the timepiece to going again. At the proper time the bird came forth and whistled "Bob White, Bob White," in good American fashion. Since then the jeweler has been called on to Americanize several other clocks.

TURN MISSISSIPPI RIVER TO SAVE CITY HARBOR

One of those practical jokes for which the Mississippi River is notorious has been threatening for some time to spoil the harbor at Memphis, Tenn., and leave the city itself high and dry some distance from the stream. The current has created a sand bar, called "Mud Isle," right where the boats used to land, and has deposited sediment in the harbor, while the opposite bank has been washing away, shifting the course of the river. Army engineers are now engaged in undoing the damage by extending a promontory out from an island near the other shore. They have built two mats of willow, one 1,400 ft. and the other 1,000 ft. long, each 100 ft. wide, carefully sewed and interlaced to resist the current. These mats are placed 1,000 ft. apart and fastened with 3,300 piles, driven in clusters to collect all the sediment possible and become permanent land elements. Thus the current will be swung back over Mud Isle and the harbor, and river men say one good high water will clear out all the trouble.

SIMPLE DEVICE FOR SELLING NEWSPAPERS A SUCCESS

Publishers of early morning newspapers in Washington, D. C., have recently been experimenting with a "wooden newsboy." The device consists of a collapsible container supported by three legs with a metal receptacle for the money. After the early editions are disposed of, the owners gather them up so they will not block the sidewalks. While everything is left to the honesty of the customers, the amount of loss is found to be almost negligible. They are also a boon to the newsboy who does not want to get up in time to sell the early editions.



COMMENT AND REVIEW

[These pages were printed February 20, 1919]

Do We Want Prosperity?

DO we want prosperity? The reply seems to be unanimous. Here is one subject on which we are all agreed; employer, employe; man, woman, and child. World conditions are, to all appearances, more favorable to a most wonderful period of prosperity for the United States, for several years to come, than ever confronted any nation in the history of the world.

But, we mustn't spill the beans!

Bankers, alone; manufacturers, alone; labor, alone; nor farmers, nor miners, nor lumbermen, and so on, alone, not even the Government alone, can make prosperity. To insure prosperity, there must be harmonious team work: everyone concerned must do his part.

The world never needed and wanted so many things which are produced by the brainwork and handwork of man, as today. For four years, the former sources of supply have either been dried up, or commodities could not be moved. The shelves in the stores of the world were never so nearly empty. Farm machinery in other lands has been wearing out with little opportunity of replacement. New fields are required which also must have new machinery. So also have the railroads of the world been wearing out, and thousands of other necessities and comforts of life have been used up or exhausted.

So much for export. What about the work to be done here at home? Millions upon millions' worth of industrial buildings, and houses, and depots, and street improvements, and good roads are needed. Then, why doesn't it start?

In the first place, there must be a reorganization and readjustment to get a plant which has been running on war work back to its former line of production. Not only in many instances an actual change in machinery, but in hundreds of cases a final settlement with the Government. This involves a vast amount of work by experienced men, who must count and weigh thousands of items, check bills for cost, inspect, adjust, make allowances, decide disputes, interpret contracts; all this before final settlement and payment can be reached. Under the most favorable conditions, this takes time, for these questions must be settled with justice to both manufacturer and the Government.

Another cause is the unsettled condition of the labor market. Labor has benefited in many ways under war conditions and naturally is reluctant to recede from its high-water mark; nor is it desirable that it should in all respects. But, does labor realize that the permanent conditions of peace cannot maintain all the emergencies of war? Some men can run very fast for a hundred yards, or even a mile; but the best cannot maintain the pace for long, or even do it every day. The horse which wins the race could not do as well on ordinary roads, nor maintain his greatest effort for an hour, much less a day or a month. In order to stop a fire, the fireman smashes costly windows, and chops away doors, and even blows up entire buildings, but we don't do these things every day. It is only an unusual emergency which makes such costly work justifiable. If it were kept up long enough, we finally wouldn't have any houses to live in. We should discriminate between what is warranted to stop a war and what is reasonable day in and day out.

Just now, in the effort to make war conditions of labor and wages permanent, we hear of strikes here, there, and everywhere. Not only in this country, but abroad. The plain truth is, no law of any country, no refusal by large masses of men to work, nothing which man has ever been able to do, or is likely ever to do, can maintain, for any length of time, abnormal conditions. The normal of today can and ought to be, and promises to be, an improvement over the normal of a few years ago. This is something we all desire, and all benefit from, a steady improvement from year to year; but business, as it exists, is powerless to maintain a sudden and supreme effort. The runner, the wrestler, the race horse, all arrived at their maximum through an advancing process, and not in a moment. Business cannot permanently maintain the high-water mark of war-time conditions in peace times any more than the race horse can deliver rural mail at a two-minute clip, six days a week.

It is quite certain that some employes feel that employers could maintain war conditions if they wanted to; but there is an equilibrium of trade, relentless as the law of gravitation, which cannot be disregarded.

At certain points on our seacoast, under stress of storm, the tides rise to unusual heights for a few hours or days, but even Old Ocean himself cannot keep up the high-water mark for 365 days in the year. The ship which tried to anchor too near shore on these high tides would soon be left a wreck high and dry on the rocks. The captain who thus lost his ship would be blamed even by the crew and passengers who urged him to do so. Even were the vessel put afloat later, there would still be the needless loss of its services, and all to no good or lasting purpose.

Improvements which can be accomplished gradually often become destructive when demanded in a moment. If every man on every farm in the country struck on July first, they couldn't make the growing corn ripen in a month from planting. If all the doctors, lawyers, workmen, farmers, manufacturers, bankers, business men, teamsters, railroad men, and all the rest, even the editors, should quit all effort for a month, they could create a condition of awful chaos, but they could not change natural laws.

Every boy would like to be a man tomorrow, but it can't be done; it takes time to make a man out of a boy; always has, always will. We can all remember when the hours and conditions and pay, for everybody, were very arduous. I haven't forgotten the time when, as a boy, I worked 16 hours a day for $4 a week, and it was the going rate of wages, too. Nobody has to do that now, thank goodness. Normal conditions, as compared with 40, 30, 20, 10 years ago, are immeasurably improved, but it has taken time. The jump from 40 years ago to the present couldn't have been made in a day, or month, or year, no matter how many of us struck. There has been a grand improvement, however, don't let us forget that, and there are due to be more improvements in the years immediately to come; but while waiting for the better and still better things, is it really wise to be too impatient in our haste to reach the goal? Instead of trying to sail the ship ashore on a storm tide, isn't it better to dredge a channel inshore, to reach the same point?

The old-time employer, too many of him, was regardless and thoughtless of his workers. The employer of today, as a class, is a very different type of man. There is a great deal he can yet do, and—in spite of the poison counsel of Bolsheviki—which he heartily wants to do, and will, given time. He, too, has his troubles and finds it impossible to make a five or ten-year advance in a day, but he is speeding up all the time. He is in the midst of a reorganization brought about by the war, and the most of him is conscientiously doing the best he can, or knows how; probably few of all his several thousand employes, if given his job, could do any better.

Would it not, then, seem the fair, the loyal, the sensible thing to coöperate with him to the fullest extent instead of demanding war-time conditions or better, just at this critical moment; or even going on strike in the effort to secure that which, however desirable, may be most difficult or even impossible to grant while the country is trying to get under way again?

Again we suggest, don't spill the beans.

* * *

The Seattle Strike

SINCE the above was written, the Seattle strike has occurred. This strike was unique as being the first sympathetic strike in which all the industrial workers in a large city quit work to enforce the demands of one industry which had been out on strike some days without securing its demands. The original strikers, those who demanded higher wages, were employed in the shipbuilding yards.

This demand was that the $4.50 a day rate be raised to $6; the $6 men to $7, and the $7 men to $8. When I visited these yards last July, the $4.50 work consisted of unskilled labor, such as moving a few pounds of bolts in a wheelbarrow, etc., and at that time was largely performed by boys of high-school age. The really skilled artisans, with some overtime, were earning as high as $30 per day.

The total number of workmen in the Seattle shipyards at the time of the strike was about 21,000. The total number employed in shipyards and boat-building plants, combined, in the entire United States at the time of the last census was only 40,506. Shipbuilding in this country did not begin to "awake" until the spring of 1917.

From whence, then, did the shipyard men of Seattle come? Some were trained artisans, but the large majority were miners from Alaska, men from small repair shops, clerks or proprietors of small stores, such as jewelry, candy, dry-goods, and similar stores in Washington, Oregon, Montana, and Idaho, most of whom saw a ship for the first time when they entered the Seattle shipyards where they earned more in one week than in a whole month at home. In view of the fact that the Government shipbuilding program since the armistice was signed lost all its emergency aspects, and is being conducted largely as a matter of honor and with the certain prospect of enormous loss, the demand of the Seattle strikers was at least a bit unreasonable and selfish. It certainly does not add any new luster to the fine record of the preceding 12 months. There really is no reason why the taxpayers of the country, already facing enormous war bills, should in peace times be required to pay more than the already highest wages paid shipbuilders in the history of the world, and which had been justified at the time, as a war measure. However, the strikers apparently thought only of themselves, and had no regard for either conditions or the ability of the country to pay. Having failed in their demands, their leaders proceeded to enlist the help of all other workers in the city, which is a good deal as if you should stop eating because I demand a higher grade of coffee, even though the coffee I now drink is perfectly good and better than I ever had in all my life. It is not a demand based on reason or argument, or in any way logical, but merely an attempt to force a condition by might, which is the very thing we have been fighting the Huns for. No one can imagine the Hun attempt at world domination had any element of benefit to the rest of the world; on the contrary, theirs was essentially a selfish motive, and also equally impossible if the world was to continue with any degree of well-being.

Such a sympathetic strike is in its nature unfair and unreasonable, just as much as a sympathetic lockout, in which every employer of labor in a city would be unfair and even cruel, to combine and close every avenue of employment, to help some other employer reduce his payroll. The Seattle episode reflects no credit on labor unions, nor is it likely that the more intelligent members approved of it, even though forced to take part.

A great many employes believe, many doubtless conscientiously, that they, or a combination of them, could conduct the industry of which they are a part, better than, or at least as well as, the "old man." So far as I know, all such efforts, and there have been not a few, have absolutely failed. The most of us can work more successfully for some one else than for ourselves. The labor unions themselves recognize this, for they will not permit their members to take any chance, nor allow the wages paid to be conditioned wholly on the larger or smaller volume of profits the plant in which they work may make in any one year. The effort at coercion in years past has not been entirely on either side, but now that a better realization of the rights of labor has come to be appreciated and adopted, cannot labor best promote its own well-being by an effort to better understand the conditions which surround the employer, many of which are beyond his control?

◆

I. W. W. and Bolsheviki

A FEW days ago, there passed through Chicago a motley collection of much-bewhiskered gentry, whom the secret-service men had acquired on the Pacific coast and who were en route to Ellis Island, preparatory to leaving the country forever. The guests of this personally conducted tour proudly claimed to be I. W. W.'s. While guilty of several things, it would be impossible to convict any one of them of contributing to the Red Cross fund and other similar objects, or of buying any Liberty bonds, or W. S. S. The charge of any suspicion of having tried to earn an honest living, or contributing in any manner to the welfare of the community, does not rest against them. Their acts are all negative and destructive.

It is possible that a genius like Marconi, if he could bring the sun down and use it in a massive X-ray machine and turn it loose on this bunch of trouble makers, might be able to discover that one or two were only I. W. W.'s and not Bolsheviki. But, to the average man, it is impossible to see any difference. They are eminently and decidedly "undesirable citizens." Their deportation then, under conditions which make it hopeless for them ever again to enter this country, is something which should give intense satisfaction no matter how high or humble one's position in life. If there is any who think otherwise, he or they will bear watching.

However discontented one may be with his lot, it is inconceivable that he should see any hope or relief in the teachings and workings of Bolshevism, which chops down the tree to get an apple. Even in Russia, the man who casts his lot with them is mercilessly tortured or assassinated tomorrow. There is nothing, absolutely nothing, with which to forecast their action, for they have no plan except that of wanton destruction, in the performance of which they live from day to day on the spoils of the moment. Their announced purpose that "the whole world should be burned over" carries not one word of hope for any better condition to arise from the ashes. And they have none.

It, therefore, behooves every man who believes in an honest life, or has ever so small a room with wife or children, or owns even a few pieces of cheap furniture, or a house, to set his face resolutely against anything and everything which bears the taint of Bolshevism. From the days of earliest history until the present moment, of all the strange and unnatural revolutions which have occurred, none save Bolshevism but has had some purpose to achieve, which at least claimed to improve conditions for the few or many. Some of these were sincere, though mistaken, some well founded, many impossible; yet they all had some goal which held out the hope and chance of something better. Even Captain Kidd's bloody pirates slaughtered and robbed to secure an ultimate life of ease and plenty for the captain and crew, where they could live in peace. If one Bolshevist has more today than another, it is the ethics of the clan that the other kill him tomorrow and take it himself.

The sooner, and to the utmost extent then, that such be searched out, and seized, and deported, the better; and while the deporting is good let us hope a Government which has had its hands more than full with a gigantic war, may now find time and ships to include every alien who is not in sympathy with our flag and a free country. As anxious as our boys in France are to get back home, we venture they would willingly postpone their voyage a trip or two, if that were necessary, to provide ships to carry these crazy inhumans out of the country. Among our insular possessions there surely must be some tropic island which nobody wants that would furnish a good place for exile. There, with some garden tools and seeds, a few thousand of these ill-omened birds of a feather could have a grand time communing with one another like a lot of snakes in a dry well.

* * *

Have a Motive

HAVE a definite motive in view as a reward for your saving, and the process will become ever so much more interesting. Mere saving, however commendable, often lacks zest, just as exercising with dumb-bells does not compare with the same effort of sawing wood, gardening, painting the fence or house. There may be an equal amount of exercise in both, but somehow there is a certain satisfaction in an effort which is visualized, that produces something one can see with his eyes.

Booker Washington worked on this plan. He took advantage of the dream of most colored people to possess a piano, to urge them to work and save to buy one. On first thought, there would seem to be ever so many things far more essential to a negro cabin than a piano, but the trouble was, while these things were indeed greatly needed, the desire was not always strong enough to prompt and hold the effort to secure them. His theory was to save for the purpose of securing something definite, with less regard for whatever that might be. For, to save, one must work; and when the working habit and saving habit once bears results, the process perpetuates itself, for there are always still more things to desire and attain.

Select some definite object, then, be it a course of study, a bit of real estate, a house, or whatever most appeals to the individual. Saving then becomes interesting, just as it did when, as boys, we saved pennies to buy firecrackers on the Fourth, or to go to the circus; and as an easy means to this end Victory bonds especially lend themselves.

Keep On Saving

IT would be unfortunate if the saving habit which was so wonderfully developed during the war should be allowed to lapse, now the war fever has abated. As a matter of fact, there is every need that we continue to save, for the treasury requirements are still colossal. It will surprise many to learn that the cost of running the Army and Navy departments alone at the present time is $50,000,000 a day, or a billion and a half per month; 18 billion for 12 months. However, if it will only result in a condition of permanent peace, no one will regret the outlay, and in any event the sooner we pay our bills, the better. The W. S. S. is still doing business at the same old stands.

* * *

Gas Masks for Miners

GREAT advance has been made over the old systems of ventilating and lighting the mines of this country, especially the coal mines; and fortunately the terrible mine disasters of a few years ago are much less frequent. The Bureau of Mines is now at work to perfect a gas mask especially for the use of miners, and out of the inventions and developments of the war will doubtless perfect something which will still further protect the miner.

A suitable gas mask will probably soon be included in the compulsory outfit of every man entering a mine, so as to be always available at an instant's notice. The sight of the miner going into a mine with a gas mask hanging from his belt may soon become as common a sight as was that of soldiers carrying masks when they entered the front-line trenches.

* * *

A Real Mayor

WHEN the labor unions of Seattle lost their heads and heedlessly precipitated the universal strike, it was most fortunate for all their members that the city had a clear-headed man as its chief. No one can suspect him of leaning toward the employers, for he himself knows from long experience what it is to work with his hands. Moreover, it was these same labor unions who made him their candidate and who voted for him, presumably to a man.

A city can no more continue, even for a few days, with all its functions at a standstill, than the individual can exist with a cessation of his bodily functions. Had the sympathetic strike lasted a week, it would have set Seattle back 25 years in its progress, and just at a time when it is forging ahead as few cities anywhere have ever done. An entire city can conceivably give itself up to a holiday in which few do any work; and it can rest from most of its labors one day in seven. Both are natural and helpful; but to abandon all effort for any length of time is suicidal. Moreover, when all workers become idlers, idleness speedily drifts into disorder; and disorder breeds passion, and passion anarchy. The progressive movement is inevitable.

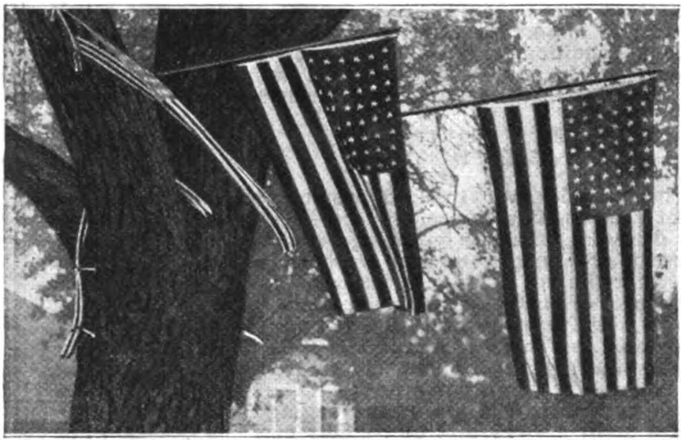
Ole Hanson, Mayor, realized all this, and set forth his proclamation in terms "written so you can understand it." He did it promptly, fearlessly, and determinedly. And in this action he did more for Seattle and its citizens than any other man ever did or is likely to do.

The unions of Seattle might profitably rid themselves of some few leaders of Bolshevist tendencies, and then join with other citizens in erecting a large bronze statue of Ole Hanson, Mayor, and set it up where they can see it every day.

H. H. WINDSOR

FAMOUS TREE A MONUMENT TO HEROES OF TWO WARS

In 1861, when the little unpleasantness between the North and the South broke out, Wyman J. Johnson, of Waterloo, N. Y., came in from the fields one day, hung his scythe in a tree, and said to his parents: "I am going to enlist in the Union army; let the scythe hang there until I return." Johnson, after serving three years, died of wounds in 1864, and, in accordance with his request, his scythe was never taken down and it still is in the tree, a fitting memorial to one who gave his life for his country. Early in 1918, two brothers, Raymond and Lynn Schaffer, on departing to join the American army and navy, respectively, also hung their scythes in this tree. In memory of Johnson, and in honor of the Schaffer brothers, three flags are kept continually floating over the three scythes.



The Famous "Scythe Tree," of Waterloo, New York: The Protruding Blade of Johnson's Scythe, Hanging There Since the Civil War, can Just be Seen on the Right Side of the Tree

SUBMERGED ORCHESTRA LEADER WORKS WITH PERISCOPE

Without any dialogue to guide him, the orchestra director of a New York pantomime's first night found it practically impossible, from his position far below the footlights, to follow the action. The theater management solved the problem by installing a periscope with its eyepiece at the director's stand. Through this instrument of erstwhile evil fame, he was able peacefully to view the whole stage, much to the edification of the observant audience.

MONTHLY WEIGHT CARDS KEEP CHECK ON CHILD'S GROWTH

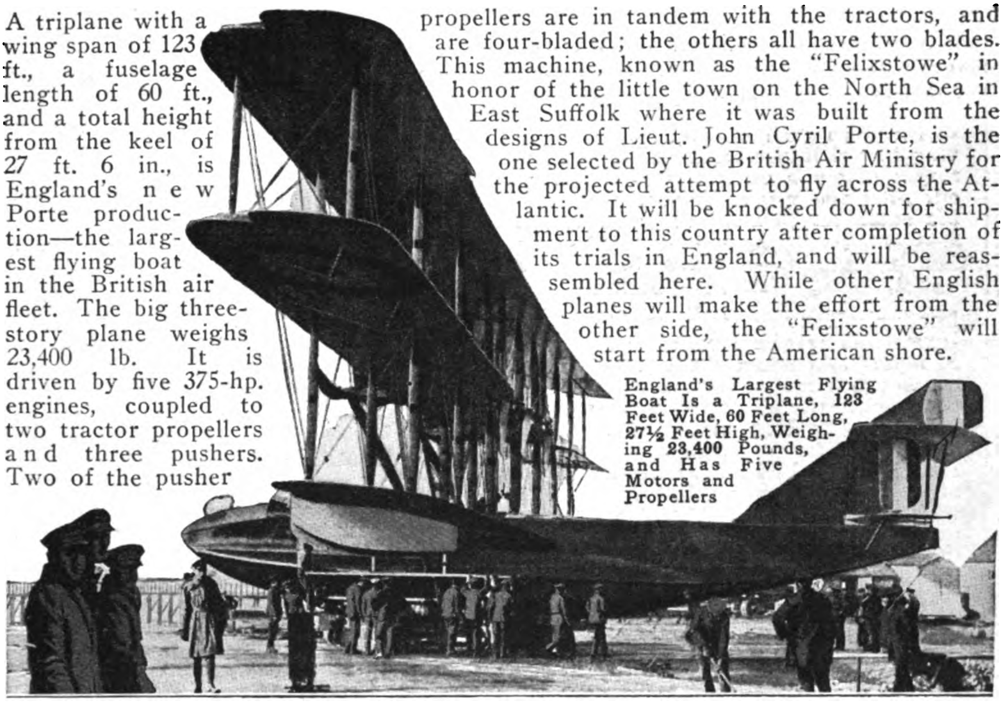
Based on the children's individual characteristics, experts have figured out just how much and what kind of food a growing child should have, and just how it should be prepared. The big problem, however, has been to get this information into the different homes. Penny lunches, scientifically selected and prepared, have been established in many schools, and while they cannot offset the malnutrition often encountered from improper nourishment at home, they are serving as a bridge to carry food instruction to the mothers. Monthly weight charts are kept on every child, and a tag is sent home each month showing just the progress that has been made, and just what its weight should be at that time. This has produced a distinct tendency to bring the home dietary up to the child's level, as that level has been fixed at school.

STOPS AUTOS, GETS TRADE BY "FREE-WATER" SIGN

Few of the many motorists who pass through a little town on the Jackson Highway, halfway between Chicago and Indianapolis, would see any occasion for stopping were it not for a sign at the edge of the sidewalk bearing an invitation to "Fill Your Radiator on Me." Even water as a gift is not to be despised when it is delivered through a hose to a radiator, which by that time probably needs it. The enterprising keeper of the café just across the walk finds that his good-will sign stops many a dollar in trade that otherwise would have whirled on down the road.

TRIPLANE FLYING BOAT IS ENGLAND'S LARGEST

A triplane with a wing span of 123 ft., a fuselage length of 60 ft., and a total height from the keel of 27 ft. 6 in., is England's new Porte production—the largest flying boat in the British air fleet. The big three-story plane weighs 23,400 lb. It is driven by five 375-hp. engines, coupled to two tractor propellers and three pushers. Two of the pusher propellers are in tandem with the tractors, and are four-bladed; the others all have two blades. This machine, known as the "Felixstowe" in honor of the little town on the North Sea in East Suffolk where it was built from the designs of Lieut. John Cyril Porte, is the one selected by the British Air Ministry for the projected attempt to fly across the Atlantic. It will be knocked down for shipment to this country after completion of its trials in England, and will be reassembled here. While other English planes will make the effort from the other side, the "Felixstowe" will start from the American shore.

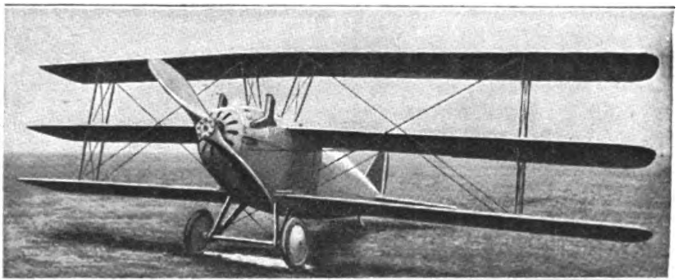


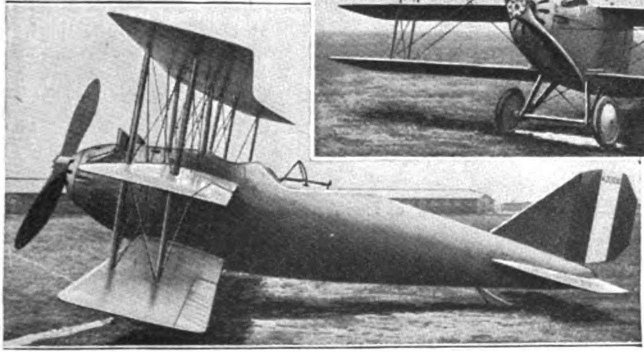
England's Largest Flying Boat Is a Triplane, 123 Feet Wide, 60 Feet Long, 27½ Feet High, Weighing 23,400 Pounds, and Has Five Motors and Propellers

PHOTO BY CENTRAL NEWS PHOTO SERVICE

GREAT SPEED IS ATTAINED BY NEW CURTISS PLANE

One of the interesting military aeroplanes of great speed and American development that may now be discussed, is the Curtiss triplane. In it is an entirely new motor of 400 hp. that is known as the "K-12." It is a 12-cylinder, V-type engine of aluminum construction, with dead weight of 1.86 lb. per rated horsepower. This, and the sharp-nosed monocoque fuselage of the plane, are largely responsible for the great speed, about 160 miles an hour, developed in horizontal flight. All three planes have exactly the same spread, 31 ft. 11 in. The height amounts to practically 10 ft., the over-all length is 23 ft. 3 in., and the depth of the wing chord, 42 in. Empty, the triplane weighs 1,825 lb., and its useful load amounts to 1,076 pounds of fuel, cargo, and passengers.





An Entirely New Aluminum 12-Cylinder V-Type Motor of 400 Horsepower is Installed in This Curtiss Triplane, Which Makes 160 Miles an Hour. It Carries 445 Pounds of Fuel and Oil, and 300 Pounds of Cargo, besides Pilot and Passenger

NEW MONUMENT OF WELCOME TO GREET RETURNING SOLDIERS

As a fitting testimonial to the valor of its soldier sons, and in honor of their homecoming, the Board of Supervisors of San Francisco has turned over an appropriation of $5,000 to the Citizens' Welcome Home Committee to be used in building a monument of welcome. This monument will consist of a column patterned after those of the Parthenon at Athens, and will be 52 ft. high. At the top of the column will be a statue, 12 ft. in height, representing winged Victory crowning the passing heroes with a laurel wreath. The monument is being erected in San Francisco's Civic Center Plaza, and it is proposed to inscribe on the base some of President Wilson's "fourteen points."

JOHN REID, ARCHITECT

SMOKE DISPOSAL ON BRITISH SEAPLANE-CARRYING SHIP

To keep the upper deck of the British seaplane carrier "Argus" entirely clear for the take-off and landing of planes, the customary funnels are dispensed with, and the smoke is discharged through horizontal funnels run under the flight deck to the stern. This rather experimental construction was entirely successful, and, like many other war-time expediencies, suggests a possible peace value for passenger vessels with unobstructed promenade decks. Usually the smoke discharge aft is wholly effective, but for the emergency of contrary winds, side passages are provided. Electric fans shift the smoke columns from stern to thwart. Operating the controllers for the fan motors, automatically turns the drafts into the smoke pipes. Side funnels were less desirable during flights, however, because the hot gases were likely to form air pockets in the path of the airmen.

CLOTH MADE FROM PINEAPPLE FIBER POPULAR IN CHINA

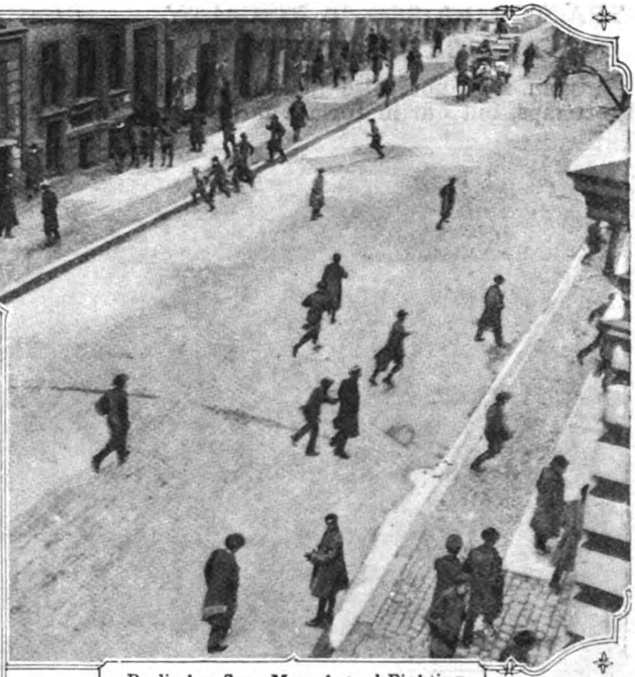
As a dessert, or for use in flavoring extracts, the pineapple is in popular demand, but very few people know that it has other uses. There are several provinces in China, however, in which the pineapple is specially cultivated for the use of the leaves in making cloth. The extraction of the fiber from the leaf is very simple. The green leaves are first soaked in a solution of lime water, after which they are taken out and scraped with a piece of broken glass. The fibers are then pulled out by using the thumb nail and forefinger, and are again soaked in water, washed, and sun-bleached. In order to make thread, the fiber is soaked in fresh water for about a half hour and then split into threads of the desired size, and pulled apart. Two threads are then joined by doubling the small end over the thick end of another thread and rolling over the knee. This process is repeated until the desired length is obtained. It is then run onto bobbins and spools and is ready for weaving. The old native looms are employed entirely for making the cloth, which is widely used for summer clothing.

MOTOR-CAR TIRE GAUGE MADE IN CONVENIENT FORM

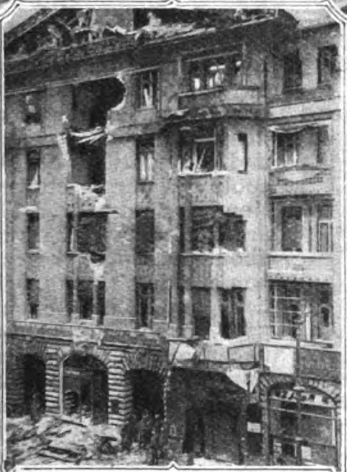
One of the season's additions to the list of accessories for the motorist is a pencil-shaped tire-pressure gauge that may be carried conveniently in a vest pocket. The instrument is 4 in. long, ½ in. in diameter, and supplied with a celluloid face that bears the conventional graduations. An internal piston controls the movement of the indicating ring, which consists of a metal sleeve supplied with a small slot, or window, through which readings may be made. To use the gauge, it is only necessary to press its lower end firmly against a tire valve.

¶It is being urged by government officials that reducing the number of designs of United States currency will lessen opportunities for counterfeiting. The contention is that the present designs are so numerous—totaling over 50—that the public is not familiar enough with many of them quickly to detect spurious currency.

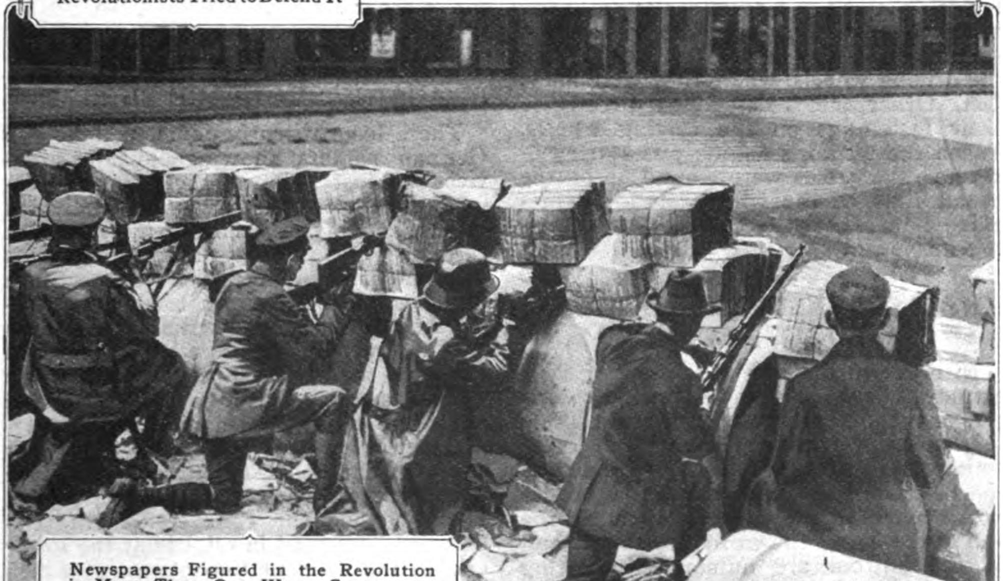
REVOLUTION'S HAVOC IN THE PRUSSIAN CAPITAL



Berlin has Seen More Actual Fighting Since the Armistice was Signed Than in 51 Months of the War She Started. German Citizens are Seen Here Taking to Cover As the Rebels and the Government Troops Open Fire on Each Other



Government Forces with Heavy Artillery Spoiled the Building of the Berlin "Vorwaerts" When Revolutionists Tried to Defend It



Newspapers Figured in the Revolution in More Than One Way. Government Troops Found Bales of Them, Supported by Rolls of Print Paper, Very Effective as Barricades, Firing from Behind Them at the Charging Rebels in the Street

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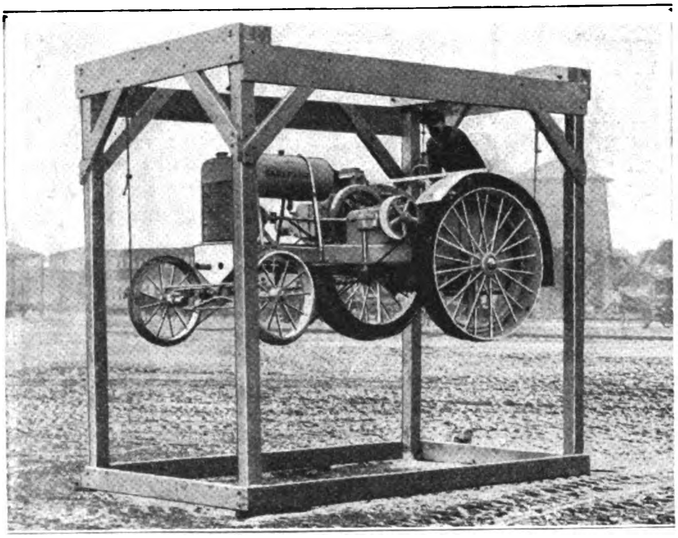
TRACTOR RAISED VERTICALLY BY ITS OWN POWER



This Farm Tractor Hoisted Itself Nine Feet in the Air by Cables Hung from the Timber Frame and Passed around the Wheels

A man may not raise himself by his bootstraps, but out in Iowa a farm tractor hoisted itself nine feet in the air by much the same process. A heavy timber frame was constructed, inclosing the tractor, and cables hung from the four inside corners. Grooved flanges were attached to the front wheels, around which two cables passed on their way to the driving wheels, where they were made fast. Other cables descended directly to their fastenings on the driving wheels. When the tractor's engine was started in reverse, the cables were wound up on the broad rims of the wheels, and the machine immediately ascended, demonstrating its power.

NEW SERVICE FLAG TO SHOW EMPLOYES RETURNED

In order to indicate the return of their employes, who had left to join the colors, the management of a prominent New York hotel worked out a new and interesting service flag. The color scheme is the reverse of the present flag, the border being blue and the center white. At the top of the flag is the word "welcome," and at the bottom are numerals indicating the number in service. As each man comes back to work, a star is placed in the white center of the flag. Gold stars are to be placed in the border.

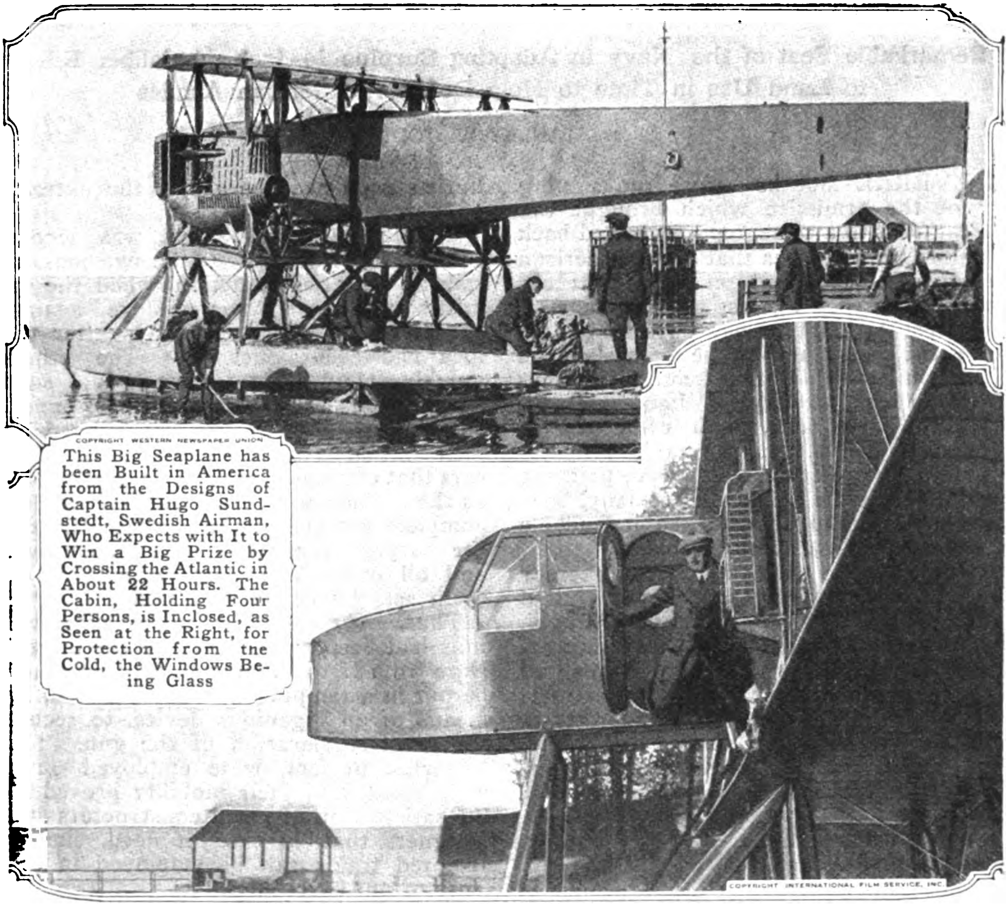
ELECTRIC PROJECTION ARC OF PECULIAR FORM

Not a great deal of progress is visible from year to year in the improvement of electric arcs for projection, so the peculiarities of one lately developed in Europe are quite interesting. A direct-current arc has a horizontal carbon rod for its positive electrode, while the negative pole is a copper ring surrounding the tip of the carbon. This ring is water-cooled, which keeps it from burning, and circulation of the cooling water by convection is automatic. The arc rotates on the ring about the tip of the carbon, making a small, brilliant crater in the end, with no obstructions between it and the projection lenses. The striking of the arc and the feed of the carbon are both automatic, the latter being ingeniously controlled by a thermoelectric arrangement. The lamp has already been found useful for motion-picture work, and has many other applications.

NEW PROTECTIVE DEVICES AGAINST VOLTAGE SURGES

There have recently come to light two German patents showing ingenious devices against electric surges. One describes a clever construction of subdivided cables, in which the cores are crossed at certain points, the outer strands being led into the interior, and vice versa. Since rapid oscillations have a tendency to remain on the surface, when a surge occurs and the current reaches a cross-over and goes into the center, it seeks a path to the outside again. But it is only a part of the surge that succeeds in this, the remainder being sent back along the outer strand. The other patent covers a fuse depending on electrostatic attraction. A U-shaped filament, connected in the circuit and immersed in oil, has at the lower end of the filament two plates, of which one is earthed and the other connected to the line. If the voltage passes the safety point the filament touches the earthed plate and fuses.

PRIVATE PLANE BUILT FOR TRANSOCEANIC TRIAL



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This Big Seaplane has been Built in America from the Designs of Captain Hugo Sundstedt, Swedish Airman, Who Expects with It to Win a Big Prize by Crossing the Atlantic in About 22 Hours. The Cabin, Holding Four Persons, is Inclosed, as Seen at the Right, for Protection from the Cold, the Windows Being Glass

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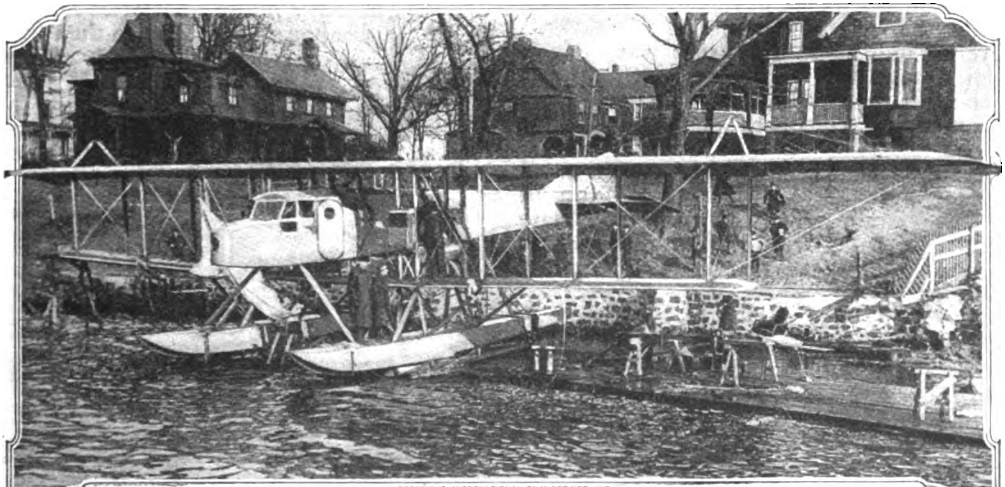

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The Wing Span of the Upper Plane Is 100 Feet; That of the Lower, 71½ Feet. In the Fuselage will be Carried 700 Gallons of Gasoline. Large Pontoons Permit Landing or Taking Off on a Rough Sea. The Over-All Length Is 72 Feet, and Two Six-Cylinder Motors, Developing 440 Horsepower, Drive Pusher-Type Propellers behind the Planes. The Total Lifting Area Is 1,537 Square Feet, Rudder Area 22 Square Feet, and Estimated Speed 80 Miles an Hour. The Plane Weighs 10,000 Pounds

GIANT NAVY RAILWAY BATTERIES USED IN FRANCE

Remarkable Feat of the Navy in Adapting Surplus 14-Inch 50-Caliber Rifles to Land Use in Time to Help Defeat the German Armies

By STANLEY W. TODD

SEVERAL months before the signing of the armistice which brought the Great War to a close, reports drifted back to the United States that giant American naval rifles mounted on railway trucks were being used against the Germans on the western front. They were said to be of great range and to be harassing the Huns in many different sectors, particularly in the vicinity of Laon and St. Quentin, and later, with even greater effect, at Sedan. In the rapid progress of the allied offensives that were pointing to the inevitable defeat of Germany, little more was heard about these formidable weapons of the American forces.

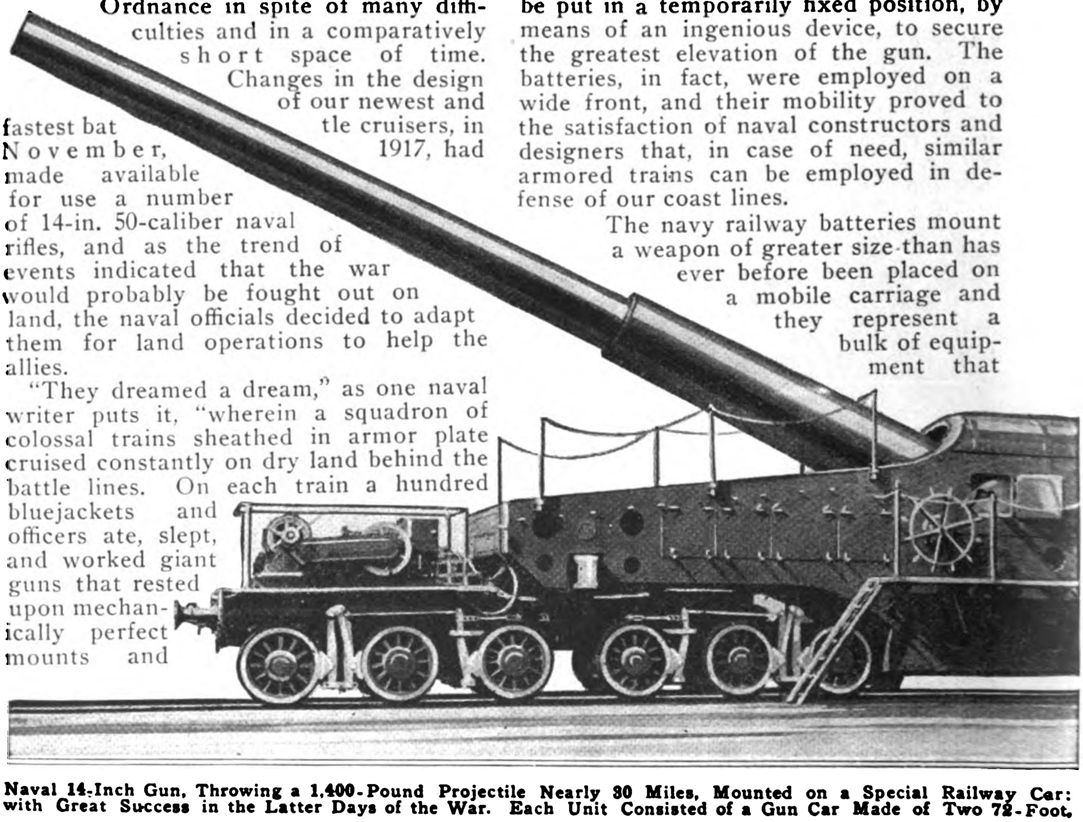
Now that the need for extreme secrecy is removed, the true story of the United States Navy railway batteries may be told. It is a tale of a remarkable feat successfully performed by the Naval Bureau of Ordnance in spite of many difficulties and in a comparatively short space of time. Changes in the design of our newest and fastest battle cruisers, in November, 1917, had made available for use a number of 14-in. 50-caliber naval rifles, and as the trend of events indicated that the war would probably be fought out on land, the naval officials decided to adapt them for land operations to help the allies.

"They dreamed a dream," as one naval writer puts it, "wherein a squadron of colossal trains sheathed in armor plate cruised constantly on dry land behind the battle lines. On each train a hundred bluejackets and officers ate, slept, and worked giant guns that rested upon mechanically perfect mounts and hurled explosive charges to the extreme of their ranges."

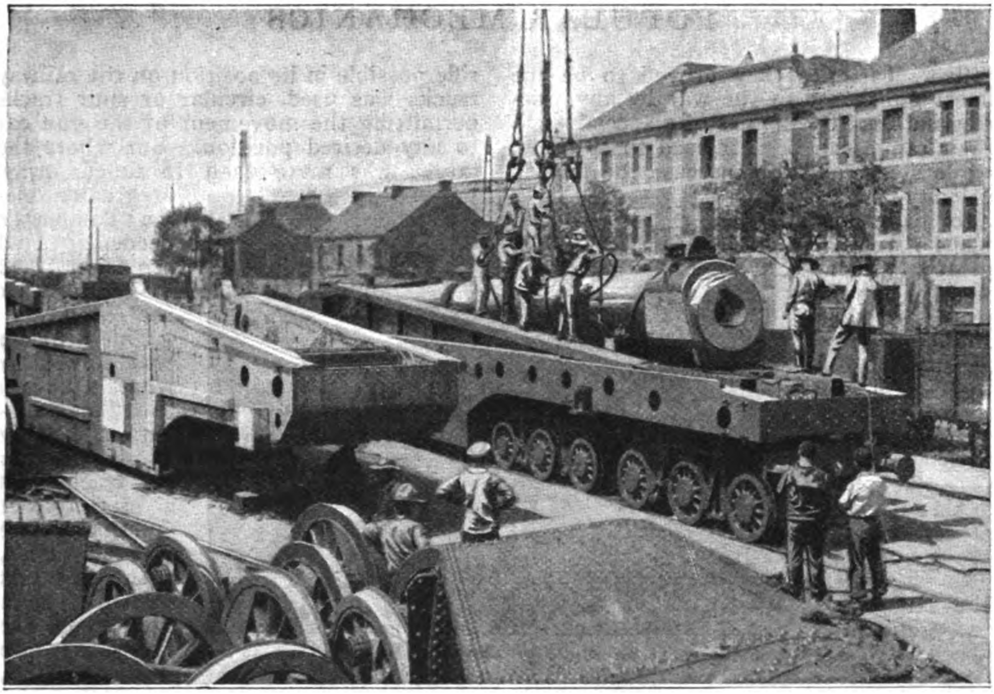
That is practically what was accomplished, and the first of the five massive railway batteries in action, when the armistice was signed, was employed against the Germans within 250 days after the idea had been conceived. The others quickly followed, and more would have been made had not hostilities ended. These were not simply guns erected on railway trucks placed among such other cars that could be obtained on the ground, as the French were compelled to use, but complete armored trains made solely for the purpose, with their own locomotives and all other units necessary to make them self-sustaining in action.

Thus, they could be moved wherever rails had been placed. Where the targets were from 15 to 25 miles away, they could be put in a temporarily fixed position, by means of an ingenious device, to secure the greatest elevation of the gun. The batteries, in fact, were employed on a wide front, and their mobility proved to the satisfaction of naval constructors and designers that, in case of need, similar armored trains can be employed in defense of our coast lines.

The navy railway batteries mount a weapon of greater size than has ever before been placed on a mobile carriage and they represent a bulk of equipment that

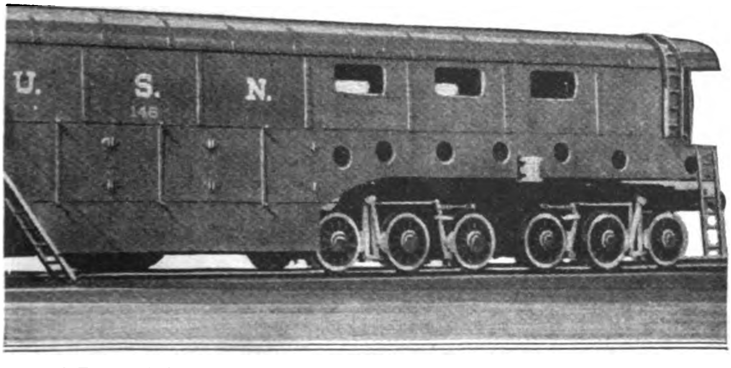


Naval 14-Inch Gun, Throwing a 1,400-Pound Projectile Nearly 30 Miles, Mounted on a Special Railway Car: with Great Success in the Latter Days of the War. Each Unit Consisted of a Gun Car Made of Two 72-Foot,



The Big Guns and Their Massive Railway Mounts were Assembled at St. Nazaire, France. Each Gun Weighs 85 Tons, the Complete Gun Car Weighing 275 Tons, and Measuring 85 Feet Long, 9 Feet Wide, and 13 Feet High. The Truck at Each End of the Car Is 25 Feet Long, Has 12 Wheels, and Weighs 25 Tons

makes all similar undertakings by other nations seem insignificant in comparison. The gun car, which is, of course, the central unit of a battery train, has somewhat the appearance of a gasoline-motor rail car, with the gun projecting from one end, apparently supported by two sets of 12-wheel railway trucks. The gun car is 85 ft. long, 9 ft. wide, and about 13 ft. high. It is constructed of two giant girders, 72 ft. long and weighing 145,000 lb., upon which are placed the gun mount and elevating gear, and the gun itself, which is 59 ft. long. When traveling, the barrel is set parallel with the train.



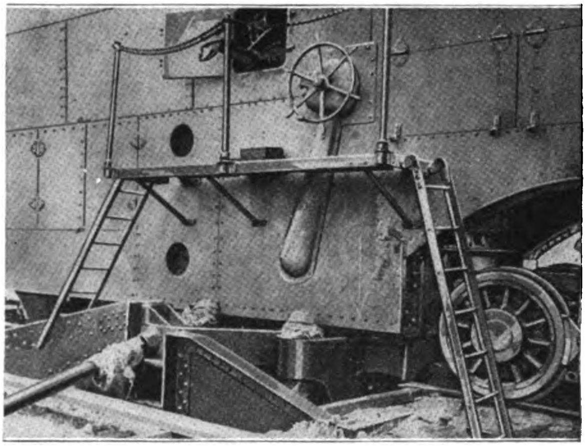
Five of These Units were Used against the Germans near Laon and Verdun
72-Ton Bridge Girders on 12-Wheel Trucks, a Locomotive, and 14 Other Cars

Besides the gun car, a railway battery is made up of a 145-ton American locomotive of the most powerful type; a sand and log car; a crane car; four cars of foundation materials; a workshop car; a battery-headquarters car; a kitchen car; three berthing cars where the officers and men sleep; and two ammunition cars, each holding 100 rounds of ammunition for the giant gun. All of them are covered with bullet-proof steel armor, which together weighs eight tons. The gun unit weighs 275 tons. Each railway battery is thus made up of 16 separate units. In France, each of these formidable batteries was manned by a specially trained crew of 100 sailors, as expert in gunnery as any on a battleship. A train crew to handle the movement of the battery and experienced in train operation was also part of the complement.

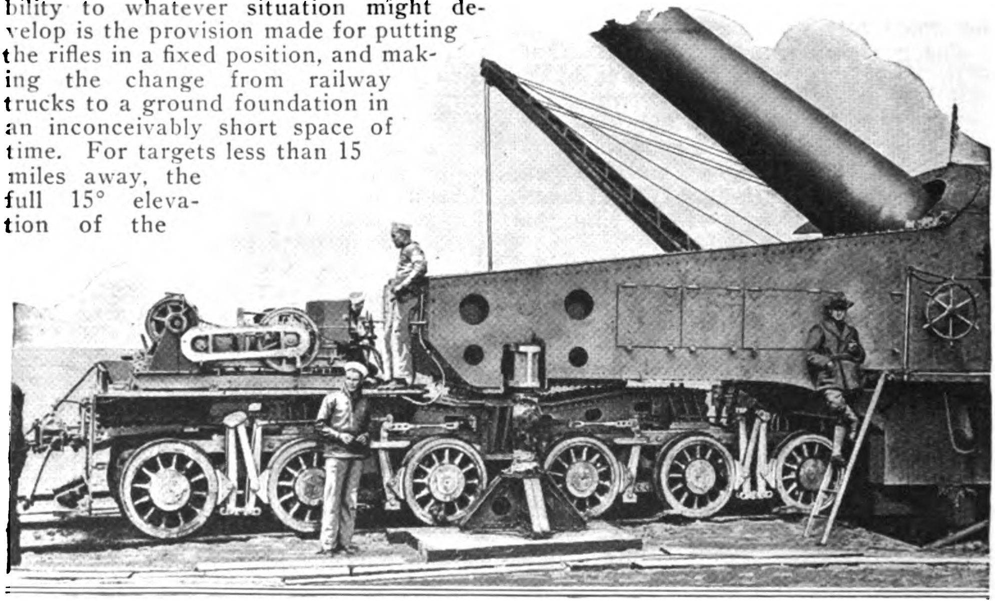
As to the ability of these giant naval rifles and their accuracy of fire, the Germans are in a position to testify. Originally designed to throw a projectile of 1,400 lb. over a range of 26 miles, as part of the railway batteries they proved to be the finest guns used in the war by any warring nation. By the use of a special shell, their range can be increased to 30 miles, while steps taken to increase the muzzle velocity has also made possible even greater accuracy. The projectiles used in France were mostly of the high-explosive type. When the gun was fired on the rails, there was a backward movement of the car of 26 ft. The shells left the muzzle of the gun at a speed of 2,800 ft. a second—a greater velocity than possessed by any gun of its kind. The powder charge was 484 lb., developing a kinetic energy of about 4,000,000 ft.-lb., the recoil being absorbed by a hydraulic brake with a 44-in. slide.

The railway batteries were built for use under fire, and several of them underwent it. A remarkable feature of their adaptability to whatever situation might develop is the provision made for putting the rifles in a fixed position, and making the change from railway trucks to a ground foundation in an inconceivably short space of time. For targets less than 15 miles away, the full 15° elevation of the rifle possible in its position on the railway trucks was used, circular or spur tracks permitting the movement of the gun car to any desired position. But where the target was more than 15 miles away, a greater elevation was needed, and provision had to be made for the recoil.

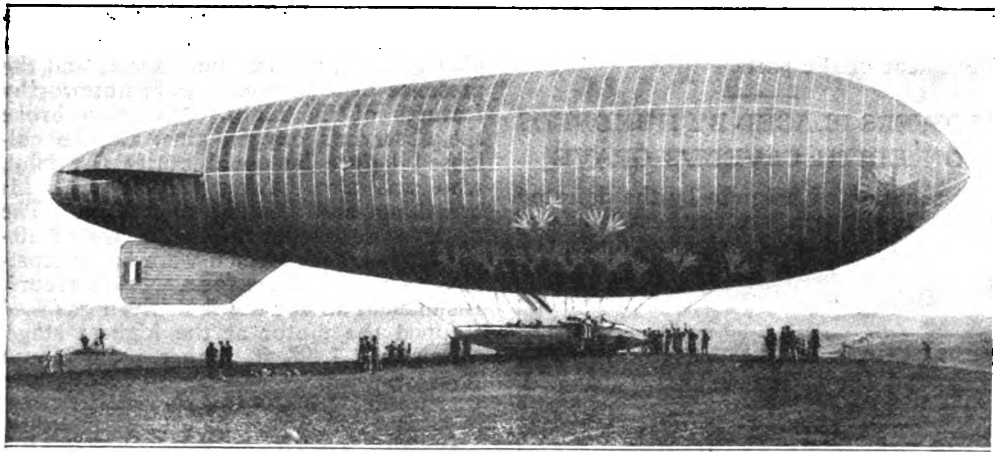
This problem was solved by what is known as a "pit foundation." A pit is dug under the tracks and a steel girder and timber base are erected, both being part of the train equipment. The gun car is run over the pit, where the monstrous gun and girders are lifted up from the railway trucks by means of heavy jacks, the foundation built up to meet them, and the trucks moved away. Thus, in comparatively few moments, it was possible to put the rifles on a stable foundation, where the limit of a 45° arc elevation could be obtained, while a traveling



For Firing at an Angle of Elevation Greater Than 15°, a Pit Foundation was Prepared and the Gun Mount Deposited on It by Powerful Jacks



The Elevation for the Extreme Range of Nearly 30 Miles: This View Reveals How the Great Girders of the Gun Car are Jacked Up from the Trucks When the Pit Foundation is Used. The Angle of Elevation Here Is About 45°. For Shorter Ranges the Gun is Fired from the Rails



The Largest Dirigible in the United States, the "C1," Which Made a Flight of 1,385 Miles from Far Rockaway Naval Air Station, New York, to Key West, Florida

gear made it possible to train the gun from right to left sufficiently to insure accuracy of fire up to 25 miles. The targets were often very definite objects, like a railway junction, and subsequent investigation showed that the naval gunners made few misses. Airplanes helped to spot the targets.

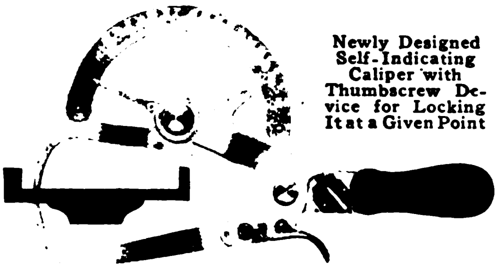
Some idea of the tremendous range of these rifles can be gained from the difficulties encountered in finding a suitable proving ground here before they were sent abroad. None of those available was large enough, and the first gun car had to be taken to Sandy Hook for trial. The gun gave plenty of evidence that it could shoot straight and true, and soon afterward it was on its way to the western front to speed the German retreat.

AMERICA'S LARGEST DIRIGIBLE FINISHES LONG FLIGHT

From the Naval Air Station at Far Rockaway, N. Y., to Key West, Fla., was the flight made by the "C1," America's largest dirigible, a distance of about 1,385 miles, in 29½ hours. Capt. S. V. Parker and his crew of six men experienced few difficulties with the big craft and maintained an average speed of 47 miles an hour. They left Far Rockaway Sunday morning, January 12, and arrived at Key West Wednesday, January 15, at 2:58 p. m., stopping at Hampton Roads, Va., Georgetown, S. C., and Brunswick, Ga. The only repairs made en route were a broken lead pipe fixed in mid-air by crawling out on the outrigging, and a faulty steering gear, for which a landing was made, the natives below being told what help was needed by notes sent down in parachutes. The highest altitude reached was 2,500 ft., and the only storm encountered was a harmless squall off Jupiter, Fla. This remarkable record in long flights was supplemented a few weeks later by the performance of a sister dirigible, the "C3," which ascended at Cape May, N. J., and stayed aloft 33 hr. 6 min. This is asserted to be the world's endurance record for nonrigid air craft.

NEWLY DESIGNED CALIPER TO FILL LONG-FELT WANT

What promises to be a very valuable addition to mechanical devices is a newly designed caliper to which is attached a graded scale, enabling the user to get his reading immediately. In construction this caliper is extremely simple and is so arranged that any wear on the parts may be taken up by a slight adjustment. One of the main features of the device is the adjusting screw, located next to the handle, by which any specified measurement may be retained. The lower, or movable leg, is interchangeable, and any desired shape may be substituted. The caliper



Newly Designed Self-Indicating Caliper with Thumbscrew Device for Locking It at a Given Point may readily be operated by one hand, ball bearings effecting an especially easy movement of the parts.

FLOWERS PLACED BY HUNDREDS ON EDITH CAVELL'S GRAVE

Evacuation of Belgium by the defeated Germans placed in the reverent hands of the allied armies the grave of Edith Cavell, the English nurse of imperishable name who was murdered by German military order Oct. 13, 1915. The grave, in the yard of the prison of St. Gilles, in the suburbs of Brussels, has been decorated with flowers by hundreds of visitors. Among the cards attached to the decorative evidences of affectionate emotion are many bearing names of high rank.

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Grave of Edith Cavell, Slain by the Germans in 1915, at St. Gilles, Belgium, as It Looked After Hundreds of Visitors had Decorated It with Flowers

FLIER IN NEW HEIGHT RECORD BREAKS OXYGEN PIPE

Six miles up the air grows thin and very cold and an airman up there with a broken pipe on his oxygen bottle is in a serious predicament. That is what happened to Lieutenant Blowes, of the British army, when his pilot, Capt. Andrew Lang, of Australia, broke the altitude record by reaching 30,500 ft. in a British plane. The time, 66 min. 15 sec., and the presence of a passenger were noteworthy features of the flight. Vibration broke the observer's oxygen pipe, and he collapsed before he could notify the pilot, who was also having trouble with his breathing and heating apparatus. The observer recovered on the return to 10,000 ft., but both airmen were badly frostbitten—a small price for a world's record. Insufficient air for the fan-driven gas feed stopped the motor at the highest stage, which was 1,498 ft. higher than Mount Everest.

LEATHER SUPERSEDES PAINT FOR AUTO-BODY FINISH

Several automobiles have appeared lately along the Pacific coast with their bodies entirely covered with a skin of leather as smooth and close-fitting as the original paint itself. One of the modern imitations of leather has also been adapted to this novel purpose with entire mechanical satisfaction and unusually pleasing effect. Both Spanish and patent-leather finishes are used, in some cases covering fenders and shock absorbers as well as body. The leather or substitute is backed with a special adhesive and applied, over the old paint if necessary, to all parts of body and hood. Wiping with a damp chamois skin or sponge, and occasional dressing with wax, is all the attention needed to keep the surface indefinitely in good condition.

PLANT NEW TREES TO RESTORE DESTROYED FRENCH FORESTS

Plans have been made, and now await only the official sanction of the French government, to begin the restoration of famous French forests by transplanting Norwegian trees. The plan originated in Norway, where it has aroused considerable enthusiasm, the proposition being to plant 250 acres a year over a period of five years. The spot selected for this work was formerly the site of one of France's most beautiful forests, extending from the Ardennes toward the Belgian frontier, just behind Arras. The plan calls for not the slightest expense on the part of France, it being proposed to send over Norwegian experts with the proper equipment of trees, tools, stores, etc., the money being furnished by subscription.

THE EYE BEHIND THE LINES

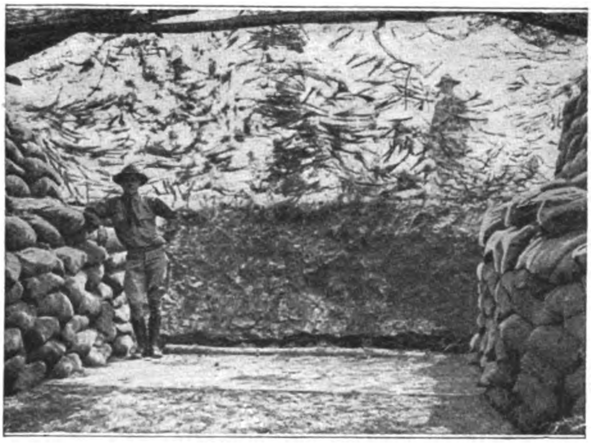
Thrilling Story of Winning Battles with Photographs Told in Detail for the First Time

By DOUGLASS REID

Part II.—The Stereoscope—Deadliest Weapon of the War

BESIDE the plush album on the center table in the parlor of half the homes in America rests one of the deadliest weapons of this war. And yet, in all of American preparedness plans, in all the arming of a nation, not one voice lifted itself to suggest that a million citizen soldiers spring up overnight with stereoscopes in their hands.

The old-fashioned stereoscope through which Uncle Elmer, Aunt Hetty, and little Chester—Sunday visitors—used to gaze so breathlessly upon marvelous views of the Mammoth Cave, Lincoln's Funeral, and Sardine Fishers off Brittany; this quaint semiridiculous old instrument of Sabbath entertainment carried roaring, smashing hell to the Huns of Wilhelm, the "scourge of the world."



This Battery Camouflage—Wire Netting Covered with Wisps of Straw—Defied Ordinary Photography but Yielded Its Secrets to the Stereoscopic Method. The Picture Represents an American Reproduction of the Most Perfect Type of Gun Concealment Ever Developed by the Germans

It was the stereoscope that proved to be the greatest single aid to the detectives of the aerial photography corps of the allies in their discovery of the expertly hidden batteries of the Germans. It was the stereoscope that penetrated the best battery camouflage that German artillerymen ever devised. Further than that, it removed the one great obstacle to the correct reading of aerial prints—lack of the proper perspective. The camera in the air shoots directly downward, in its pictures the height of objects is lost, and an entirely new viewpoint on the world given the observer. The familiar objects of life become mysterious to him when he cannot see their dimensions in the common fashion.

The picture made by a camera looks with one eye. A man looks with two eyes, and these two eyes, being a few inches apart, inform the brain that the object looked at has length, breadth, and depth. A one-eyed man looking at the front of a house would say it was a wall, but if he had another eye it would see a little of the side of the house and signal the information to the brain that the object had three dimensions.

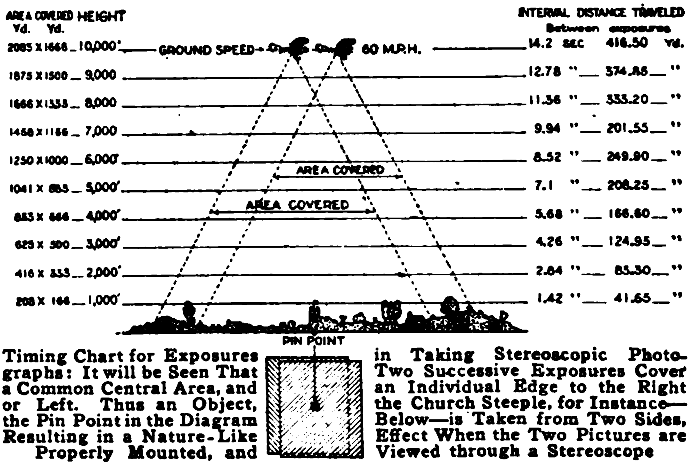
A one-eyed or cross-eyed man is not successful as a baseball player because it takes two eyes, and these in the proper axial relation, to judge an object coming directly toward him. Viewing an approaching baseball with two eyes, the player sees not only the growing size of the object, but each eye sees it from a slightly different angle—and can judge its speed.

A sage hen in the West can easily be killed with a thrown stone, because the bird viewing the approaching pebble with only one eye cannot judge its path or dodge it.

Now the aerial photographers applied this truth as follows: They knew that two photographs taken of the same object with an ordinary stereoscopic camera, in which the lenses are 2¾ in. apart, would not produce the stereoscopic effect, since the object photographed would be miles below, too far for the camera to catch its dimensions and make them apparent in a picture.

However, the photographers bethought themselves that if they put 100 yd. between the two pictures—snapped a trench from one elevation, moved 100 yd. ahead on a level, then shot again—it would be as though a giant with 100 yd. between his eyes were looking at the object.

So they tried this, mounting the resultant photographs on cardboard and looking at them through an old-fashioned stereoscope. The result was better than their anticipations; the depth and height of objects were tremendously exaggerated. A cottage looked like a tower, a bucket like a well, a trench like a cañon, a hill like a mountain. But they soon learned to translate these eccentricities into common sense—the great thing had been done, the landscape was made to assume reality in pictures.



Timing Chart for Exposures in Taking Stereoscopic Photographs: It will be Seen That Two Successive Exposures Cover a Common Central Area, and an Individual Edge to the Right or Left. Thus an Object, the Church Steeple, for Instance—the Pin Point in the Diagram Below—is Taken from Two Sides, Resulting in a Nature-Like Effect When the Two Pictures are Properly Mounted, and Viewed through a Stereoscope

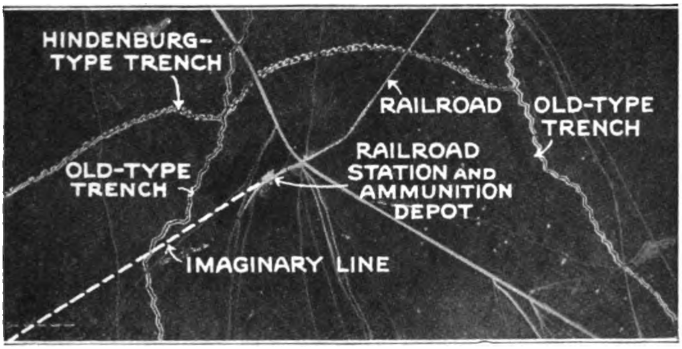
Hundreds of mysterious little specks, trails, and lumps on every aerial photograph, which before had troubled the men who examined them so carefully with their magnifying glasses, could now be recognized quickly and easily. The discussions, arguments, and quarrels between the photographers who reported thus and so to the infantrymen, and who were contradicted by the latter, were thereafter banished from the conferences of the commanders. They could now tell whether a white spot on the ground was a flat, canvas, bull's-eye panel signal to enemy airmen, or a slightly raised or slightly sunk concrete platform for a machine gun. The black bottom of a shell hole, and the black entrance to a subterranean gallery, were now as distinct to the observers as to the infantrymen who charged across them. Roadside ditches, in which men might lie in insufficient shelter, could now be told from high walls behind which there was ample shelter—an extremely important thing to know when men are to charge into such territory. Steep slopes up which the men were to charge, and which had been in ordinary photographs flat as water, now showed themselves in their true nature—death traps—and the discovery of the fact saved the lives of the attackers. All the irregularities of the terrain, gulleys, ridges, etc., that would hinder or help military operations, were now revealed, and with such exaggeration that no student could miss them.

One grave danger was ever present in this stereoscopic work, however; if the stereos were not mounted correctly, if the picture for the left eye was mounted on the right-hand side of the card and the right picture on the left, then the whole scene would be reversed—trenches would be walls; shell holes, mounds; hills, valleys, etc. And if the mistake were not detected in time, assaulting troops might be sent into this sector and, mystified, be cut to pieces.

One sure way to detect an error of this kind was available if the picture contained a house or a river, for then the sinking of a house into the earth, or the progress of a river along the crest of a hill, would become immediately and ridiculously apparent.

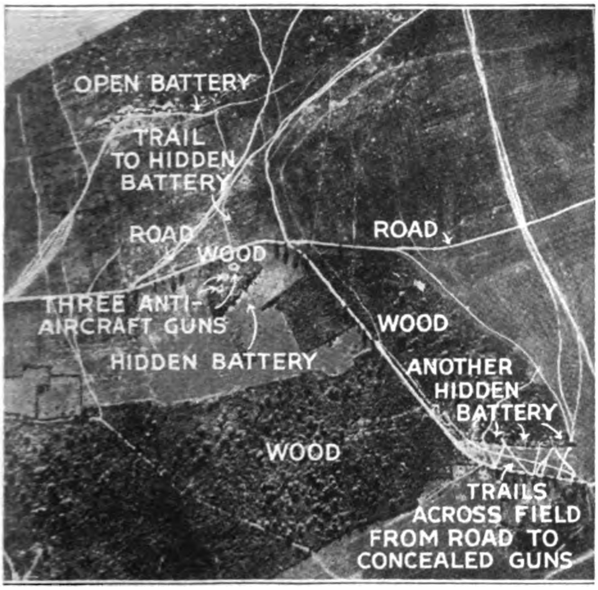
But the stereoscope's most important victory was over enemy camouflage. The Hun artillerymen were proud of their wire-netting scheme. This consisted of a covering of ordinary latticed wire over their gun. It did not blanket the gun or its men from the light, yet it did hide them, for the crisscrossing strands of wire broke up the vision of the ordinary camera from above. One photograph of it would show nothing, since the wire muddled all outlines beneath it. A picture of the lattice would in reality show the gun and the men, but the human eye, used to certain definite outlines and shapes as meaning certain definite things, could not see them.

So the stereoscope men took two views of each of these, one picture from one side, the other from the opposite side, printed them, superimposed them before the observer's eye by means of the stereoscope, and the whole gun stood revealed, the portions of its outlines missing in the one picture being supplied in the other. Often, too, men in outposts and listening posts, snipers, and all the horde of secretive characters who made war silently picturesque, hid under this wire screen and lay laughing up at the camera planes that sought to unmask them. They had only to wait until the photographer had gone home, delivered his pictures, via stereoscope, to the artillerymen, to have a deluge of shells fall upon them.



A Railroad Station and Ammunition Depot had been Blown Up by German Shells. The Hun Battery must be Located and Destroyed. But How? This Photograph Gave the Clue. The Shells Used All Fell in One Line, Some Short of and Others beyond the Station. This Line was Extended Back into the German Positions and Another Similar Line Determined from Photographs of a Bombarded Station 30 Miles Away. The Intersection of the Two Lines was Shelled and Soon the Big Guns were Silenced

I can imagine the allied photographer in the dark room, holding the stereoscope to his eyes and laughing at the Hun in the hole who laughed up at him, while the guns outside are tolling the Germans' doom.



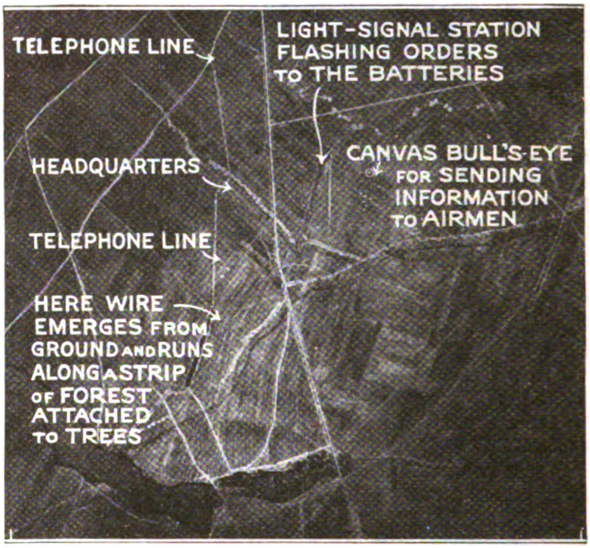
A Favorite Trick of the Germans, to Confuse the Camera Scouts, Was to Place Some Batteries in the Open and Conceal Others, Generally on the Edge of Some Near-By Wood. A Russian, Prisoner of the Germans and Captured by the Allies, Told of having Assisted in Building Two Hidden Batteries in This Location. The Photograph Showed Up a Path Leading to One of Them and Trails from a Road to the Other. It Also Revealed Three Anti-Aircraft Guns near the First Battery

The stereoscope's work on batteries does not lessen the extreme value of the ordinary camera picture. The photographers attached to the United States army worked in close liaison with the artillery and infantry, supplying both with information that meant life and death to them, giving them the clues, the hints, the vital revelations about the enemy's plans. Before the camera detectives came to the rescue, the German battery tricks were dark to the allies. Balloon and listening-post observation was not completely satisfactory. At night, the watching intelligence officers would catch the flashes of German guns, mark their location and shell the point violently, only to fail. The next night the flashes were here, there, everywhere.

Pictures proved that the Germans had four emplacements for each battery of light fieldpieces (corresponding to the famous French 75's), and that each battery contained four cannon. The emplacements would sometimes be a mile from each other, and during the night it was the custom of the Germans to move the battery from one place to another, so that the allies could not locate them. After the battery had left an emplacement, some artillerymen would remain behind to fire off flares, one after the other, four in number and close together, in imitation of a battery at work. Then, in all four of the various emplacements, flares would flash into the night, and the allied observers would be puzzled, indeed, for it was evident that only from one of them shells were issuing. Which was it?

The camera men got the answer.

When a cannon shoots directly ahead—that is, with only a slight elevation of the muzzle—it whips up the ground for a few feet around with the very force of its concussions. These marks—called "blast marks"—the camera detects. Consequently, discovering all four battery emplacements by the stereoscopic method and locating the shell blasts with the ordinary photographs, the detectives show just where the night flares were real cannon discharges and where they were false flashes. The winds are usually strong enough to smooth out the telltale blast marks within 24 hours.


TELEPHONE LINE
LIGHT-SIGNAL STATION FLASHING ORDERS TO THE BATTERIES
HEADQUARTERS
CANVAS BULL'S-EYE FOR SENDING INFORMATION TO AIRMEN
TELEPHONE LINE
HERE WIRE EMERGES FROM GROUND AND RUNS ALONG A STRIP OF FOREST ATTACHED TO TREES

German Headquarters for Correction of Artillery Fire, Caught by French Camera Scout: It was Located by Following Telegraph or Telephone Lines to Their Converging Point, and Further Identified by the Installation Near By of Stations for Flashing Orders to the Various Batteries and to Airmen

Even without the stereoscope, the camera can locate well-hidden batteries by the mere location of these concussion marks, and when snow falls, the camera men are joyous, for then every discharge is marked unmistakably, the blast marks being black on snow, while on the ground they are white.

The snow is merciless, and every footprint, every truck track, is as apparent as red paint on a canvas. Often the Germans in their efficient haste would construct new batteries while the snow was still on. How the allied photographers whooped at this and hurried home to show the new works, black, distinct—an easy target for both bombers and artillery!

Wire-Netting and Straw Camouflage Taken by Single Exposure with Ordinary Camera: The Light Rays are Broken Up So That the Picture Reveals Nothing of What is Concealed Behind

The allies used almost as many photographers in shooting up their own lines as in picturing the enemy lines. Whenever an artillery officer desired to place one of his own batteries in an advantageous spot, he consulted the photographic officer of his sector, and with him went over the available locations, picking and choosing a point where his guns could hide and where their blast marks would not be apparent. The edge of a wood, by the side of which ran a white wagon road, was the favorite spot for the gunners of both sides, for there the trees would hide the guns and the white road show no marks of the concussion.

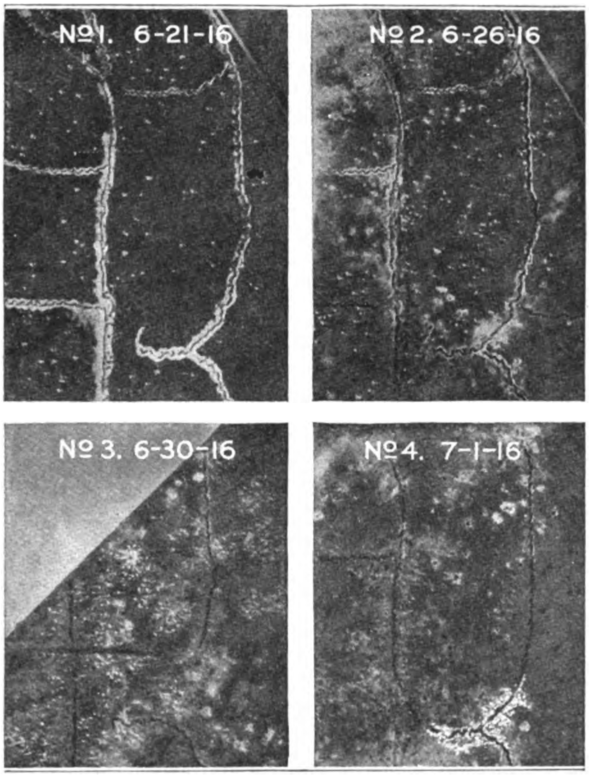
Once a French officer made a bet with a photographic officer that he could place a battery so well that no camera could detect it. He placed it in a wood, pointing his guns over a white road. It was perfect. But the photographic officer had seen in photographs a faint change of color on the road for some miles, a subtle darkening on the causeway, beginning at headquarters and running to a certain point in front of a wood. This, he reasoned, was crushed stone thrown upon the road in order to strengthen it for the passage of guns and ammunition trucks. The crushed stone, while fully as white as the road itself, was looser than the packed, hard surface of the untouched path, and absorbed more light, appearing slightly darker to the camera's eye.

So the photographic officer decided that the artilleryman had done this for moving his guns, and that where the crushed rock stopped, there was the battery. He walked over to the artillery officer's tent and collected his bet.

Quarries, sunken roads, and large ditches were other favorite hiding places for batteries, since they permitted the gunners to tunnel back under one side, place the gun there, and so, in concealment, shoot all day long. But the camera men with stereoscopic pictures caught these depressions that otherwise would have been invisible, and, by photographing the wall opposite the muzzle of the gun, caught the discoloration caused by the blasts.

When the Germans chose to hide their big guns in the middle of a forest, the task of searching them out became tremendous, for the leaves in the majority of cases defied the stereoscopes, and the cutting up of the trees by shells was not sufficient to be noticed before some weeks' steady firing.

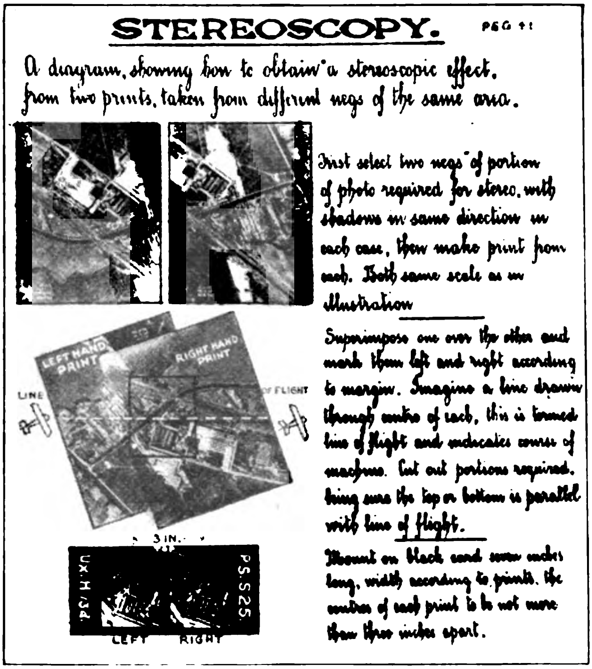
The ordinary camera's only way of locating the guns was to watch for the trails of artillerymen appearing on the edge of the wood, or the marks of motor trucks which brought ammunition up to the fringe of the forest under cover of night. Often the direction of these telltale tracks would betray the part of the wood in which the guns were concealed. Here the stereoscope, too, accomplished wonders, for it was the part of German efficiency to camouflage the guns, even though they stood in the midst of thick forests. They placed canvas, painted to resemble the floor of the forest, above the guns, at a height about two-thirds the length of the trees to which it was attached. This the stereoscope camera detected, for it revealed one portion of the wood where the ground rose up strangely. All the artillery need do was thunder shells down on this seemingly innocent spot. In nearly all these cases, the Hun's extreme reliance upon science proved his undoing, for if he had refrained from camouflage he would have been safe.



Progress of Shelling a German Trench Sector: The Gradual Disappearance of the White Borders of the Trench Lines—the Parapet and Parados—Indicates the Destruction Accomplished. On June 30, the Sector was Considered Untenable and Abandoned, So the Allied Infantry was Scheduled to "Go over the Top" the Following Morning. Luckily, the Last Photograph was Brought In in Time to Postpone the Attack, for It Showed, by the White Marks at the Bend, That the Germans had Partly Reconstructed the Trench during the Night

It was another habit of the Hun gunners to place some batteries out in the open—real batteries, on the presumption that the allies would laugh and refuse to bother with a thing that so obviously was nothing but a trick. This was good psychology for the Germans, but it didn't work; for the photographs showed footprints about the guns, telling that they were active. Had the battery been false, no tracks would have led to it.

Certain astute German officers, however, finally took to making false trails to false batteries, and for some time fooled the photographers. But the coming of snow usually saved the latter from humiliation, for at the crack of dawn they could catch pictures which revealed that no men had gone out to the guns, while the blast marks of the real batteries betrayed the latter, skillfully hidden in some other part of the field.



A diagram, showing how to obtain a stereoscopic effect, from two prints, taken from different negs of the same area.

First select two negs of portion of photo required for stereo, with shadows in same direction in each case, then make print from each. Both same scale as in illustration

Superimpose one over the other and mark them left and right according to margin. Imagine a line drawn through centre of each, this is termed line of flight and indicates course of machine. Cut out portions required, being sure the top or bottom is parallel with line of flight.

Mount on black card seven inches long, width according to prints, the centres of each print to be not more than three inches apart.

The Proper Cutting and Mounting of Stereoscopic Photographs Is of Utmost Importance, for Otherwise the Whole Scene would be Reversed, Trenches Becoming Walls, Shell Holes, Mounds, and So On, and Attacking Troops might be Sent to Useless Death

As photography became more and more important on both sides, the artillery forces became more and more expert in concealing their guns. Finally, whole groves of trees were moved here and there to mask batteries. Here the shrewdness of the clue hunter's eye became the vital thing. He had to know his territory perfectly, memorize each tree, stick, and stone. If he caught any change, however small, it meant mischief.

One photographic officer, of the French forces in the Argonne, once found a tiny, obscure glade in a forest missing. Checking back on previous photographs, he found that the glade had disappeared overnight. The stereoscope showed him that it had been a steep little slope and hence a good location for artillery. He knew instantly that the Germans had transplanted trees from the thickest part of the forest to this glade, and that cannon were at that moment working from the new position.

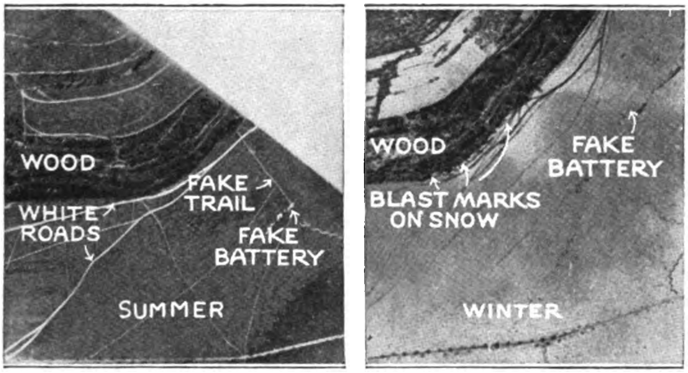
The camera, aside from its detection of battery camouflage as distinct from reality—a subject that will be taken up more completely in the next article on trench photography, where it properly belongs—was invaluable in constantly adding to that rogue's gallery of German generals which the allies collected and used so effectively. Photographs silently, surely, told the intelligence officers where such and such a German artillery officer was working, where Colonel von E. or von F. was stationed. This was in the main accomplished by recognizing his particular and distinctive tricks of camouflage. The German organization lent itself to this allied system of discovery handily, while the forces of freedom baffled the Germans in the same work; for all the allied systems of camouflage were standardized and worked out to the last detail by the department of camouflage in Paris and thence supplied to all sections of the line, while the Germans relied upon each artillery officer to work out his own system.

Hence allied photographs taken over a series of months showed the pet hobbies and theories of each Hun commander. Colonel von E., for instance, would rely upon putting out quantities of false batteries, in the meantime covering his real batteries entirely with canvas camouflage. Colonel von F. would put out no dummy guns and would choose to hide his batteries with timber, specially moved to the chosen spot. Colonel von G. habitually relied upon one dummy battery, three real ones audaciously set out in the open to disarm suspicion, and the rest hidden under wire-netting camouflage.

Through their filter lenses, which told instantly where canvas camouflage was spread, and with the stereoscope, which exposed wire netting, the photographers could show their army commanders just where these respective colonels were, just how strong their ordnance was, and from this the allied artillerymen could trace back and discover exactly how this particular officer handled his guns, which were his favorite hours for shelling, how adept his gunners were at aiming, and what had been their strong points and their weak points in previous engagements.

Where German telegraph and telephone lines stretched through the sections given over to the battery photographers, they suffered heavily, for the allied cameras were constantly searching for artillery headquarters, always to be found at the converging points of all telegraph and telephone wires from observation posts. To the officer seated in this headquarters, the observers sent in their reports on the effect of their own batteries. Over other wires the officer sent corrections to his batteries. The principal duty of the photographers was to locate this man and direct allied shells to him, for the moment he was silenced, the moment headquarters was wrecked, the German batteries were silenced—the eyes of the guns were put out.

One photograph caught a telegraph or telephone line winding to somewhere, another photograph caught another. All were traced and painstakingly run down to some common center. Where they converged there was headquarters. One carefully placed shell on this spot would relieve the allied trenches for miles about from shelling.



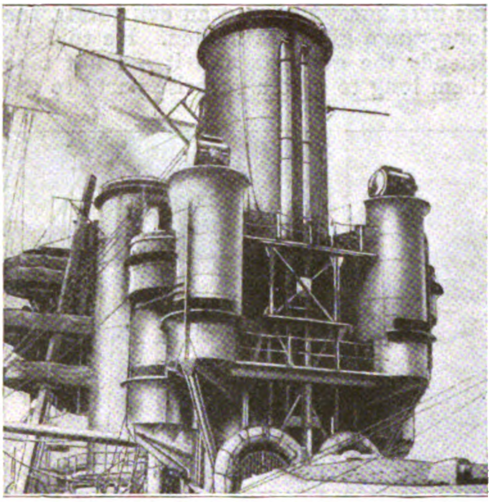
By Placing a False Battery Out in the Open and Making a Path to It from the Road, the Germans Sought to Prevent Discovery of the Hidden Battery on the Fringe of the Wood beyond the Road. But When Snow Came, the Faked Trail to the Open Battery had Disappeared, and Telltale "Blast Marks" Gave Away the Real Position of the Active Guns

By studying the photographs of their own batteries, the photographic officers of both sides often located their big-gun assailants. To the man who was being shelled, the bombs seemed to come from all directions, swirling, pounding like a storm. But to the student who pored over a photograph of the same scene, the shells were seen to come from one certain direction. Their bursts upon the ground were on a line which, when traced back on the photo map of the whole German system, would cross several suspicious spots where the German guns might be. Unable to decide just where the guilty party was, the photographic officer moved to a picture of another part of his own line where shells fell, say, yesterday. He got the line along which these bombs came, and ran it back until it intersected his first line. There in an evil forest, the long-range gun was hidden. He told his friends the gunners, and it did not take them long to give a surprise party to the well-secreted Huns who had been "strafing" them. The most elaborate battery camouflage was a collection of anti-aircraft guns, for wherever the allied fliers were met by storms of shells from "Archie," they backed off to escape the death that rode on that perfect barrage. But they knew immediately that something tremendously important was hidden, else Archie would not be so determined. So it was their fashion to haunt this sector valiantly, slipping through on clouds, photographing with long-focus cameras from a great height, scaling down in fog to within a few feet of the ground, snatching a snap picture, then darting away to safety. Death was close in such cases, and the task the severest that the photographer could meet, but his pride was challenged, his "dander was up," and, what is more important, his curiosity was aroused. He was sleuthing and "wanted to see."

(To be continued)

SEARCHLIGHTS ARE SHIELDED ON BRITISH WARSHIP

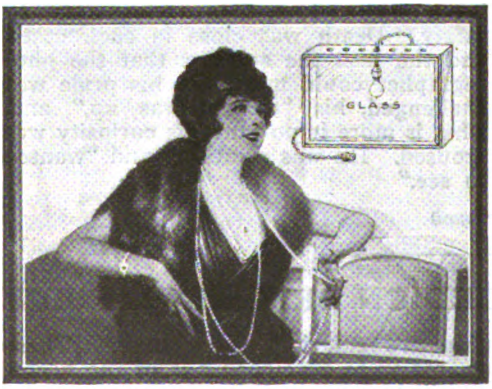
Bluejackets have a nickname for everything, and that is probably as true of the boys in the British navy as it is of our own "gobs." The cylindrical shields for the searchlights on an English battleship are called "coffee boxes." These guards were developed out of the necessity, which became evident during the war, of providing a shield for everything destructible. The searchlight shields are simply curved sections of armor plate which, viewed from the deck, look like complete cylinders. The searchlights in use project above them, and descend into them when the ship is in action.



The Cylindrical Objects to the Right and Left of the Funnel on This British Battleship, the "Marlborough," Are Shields into Which the Searchlights Descend. The Sailors Call Them "Coffee Boxes"

ELECTRIC-LIGHTED PORTRAIT IS PHOTO NOVELTY

"The Light That Lies in Woman's Eyes" seems destined to materialize with the aid of a device originated by a Chicago photographer. "Illuminated portraits" is the term applied to the novelty. The studio exposure is made in the usual manner, but instead of the customary paper print, a positive on glass is taken from the negative film. This transparency is then carefully colored from life by artists in the studio. When finished it is mounted in a box frame about three inches thick, which leaves considerable space behind the glass. In this space is a small electric lamp, hung from the top of the box, which is hinged. Small holes allow the escape of the air heated by the lamp, and a long cord and plug provide for connection to any light socket that is convenient.



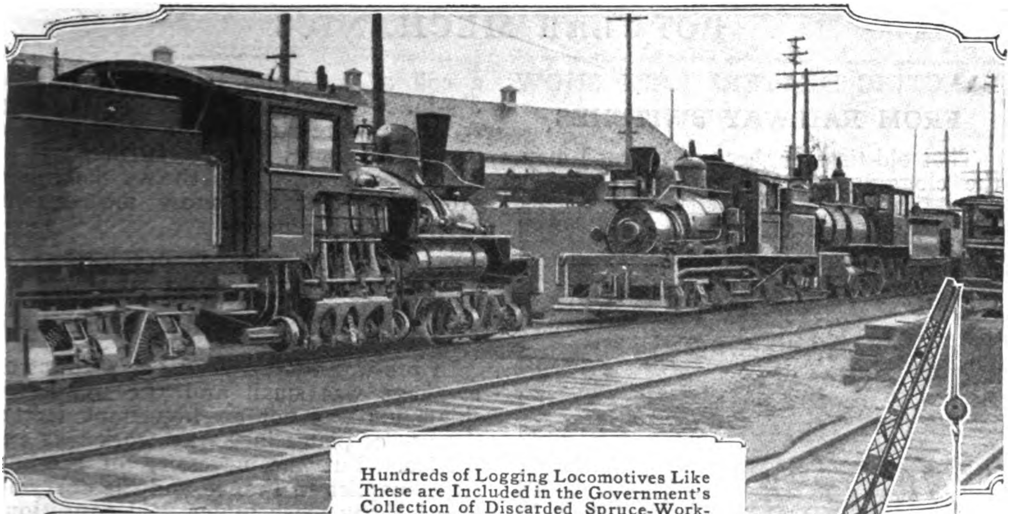
Photograph Printed on Glass and Mounted in a Hollow Frame, which Contains a Small Electric Light, Making an Illuminated Portrait

ENGLAND TO USE NEW SCHEME FOR RURAL TRANSPORTATION

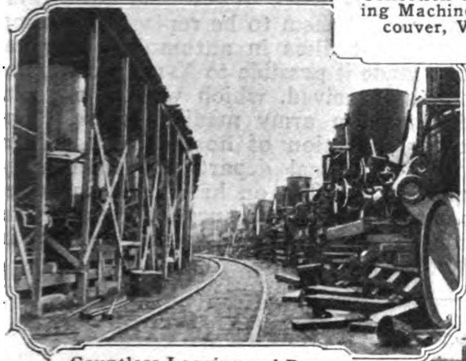
After a careful consideration of the various methods looking primarily to the promotion of agriculture, the Ministry of Reconstruction of England has come to the conclusion that an extensive system of light railways is desirable. The tracks would be of 2-ft. gauge, cheaply constructed and easily laid, either on the road, or, where that was not wide enough, over ditches and waste land alongside the road. There is much light-railway material in France and elsewhere which could be utilized, and in case this is all taken over by the French government, manufacturers are fully equipped for making new. While passenger cars have been suggested as possible, the primary use of these lines would be for the hauling of farm produce, road materials, etc., and it is considered that passenger service could scarcely be either frequent or punctual. It is also suggested that side lines could be run from the main line into each separate farm, right up to the farmer's door. Motive power could be by either steam or electricity, according to local conditions.

ACRES OF DISUSED MACHINES MARK END OF SPRUCE CUT

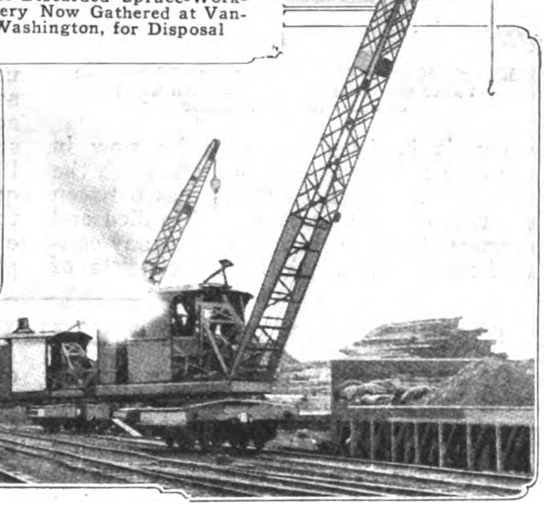
All the equipment that was used by the government to cut airplane spruce in the remote forest districts of Washington and Oregon has been assembled at Vancouver for disposal. There are great lines of logging cars with their locomotives, huge cranes capable of handling big spruce logs like matchwood, donkey engines, saws of all sorts—in fact, the greatest collection and assortment of equipment the government has gathered together since the Panama Canal was completed. The machinery, which was used by 60,000 soldier and civilian members of the Spruce Production Division, is valued at $10,000,000 and covers acres of land at the point where it is stored.



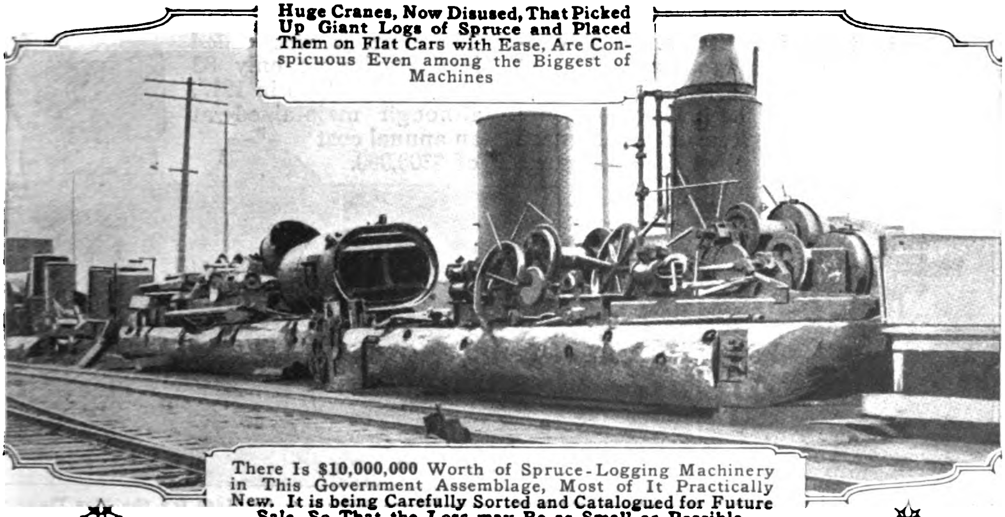
Hundreds of Logging Locomotives Like These are Included in the Government's Collection of Discarded Spruce-Working Machinery Now Gathered at Vancouver, Washington, for Disposal



Countless Logging and Donkey Engines of Every Type Are among the Articles Found Unnecessary, Now That the Pressing Demand for Airplane Spruce has Passed



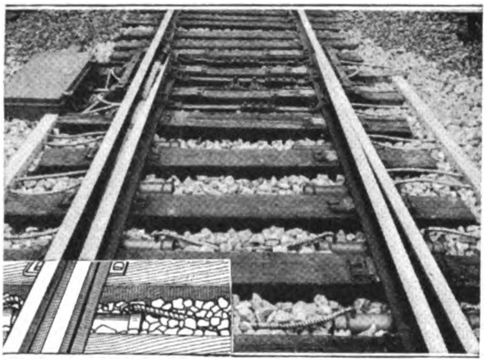
Huge Cranes, Now Disused, That Picked Up Giant Logs of Spruce and Placed Them on Flat Cars with Ease, Are Conspicuous Even among the Biggest of Machines



There Is **$10,000,000** Worth of Spruce-Logging Machinery in This Government Assemblage, Most of It Practically New. **It is being Carefully Sorted and Catalogued for Future Sale, So That the Loss may Be as Small as Possible**

ELECTRIC HEATERS KEEP SNOW FROM RAILWAY SWITCHES

That old-time bugbear of railroad men, the clogging of switches and frogs by snow, is banished by a device now in use on an eastern road. Just beneath the rails of the switch, in the spaces between the ties, electric heaters are installed and connected to a current cut-off at any convenient point. Each heater consists of a coil of resistance wire inclosed in a 3½-in. wrought-iron pipe, 20 in. long. A temperature rise of 180°F. is attained in half an hour, with a further rise of 63° in an hour. This thaws the frozen ground so that the snow melted from the rails drains into it.



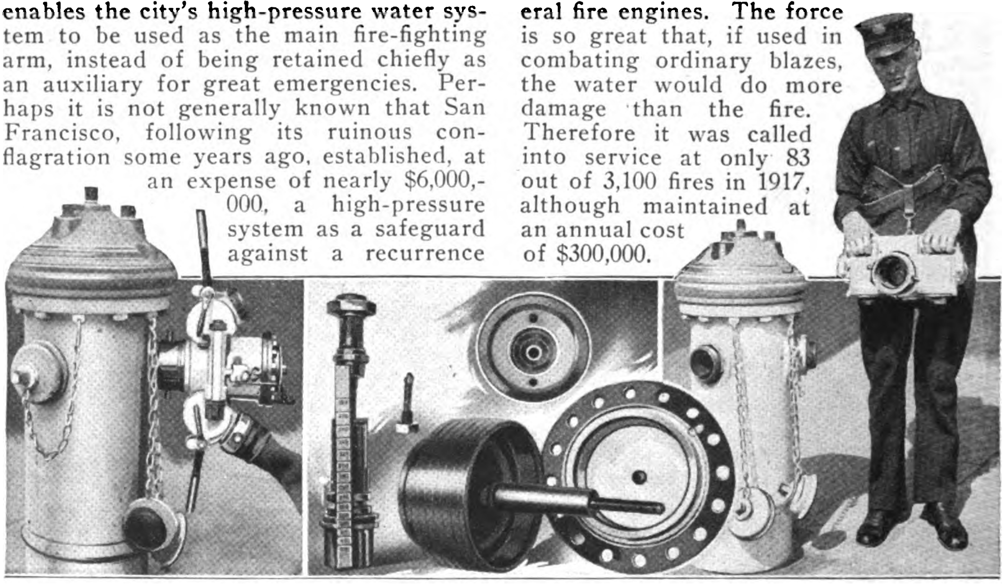
Electric-Heating Coils in Sections of Iron Pipe under the Rails Keep the Switch Clear of Snow in All Weather

FILMS REPLACING PLATES FOR ARMY X-RAY WORK

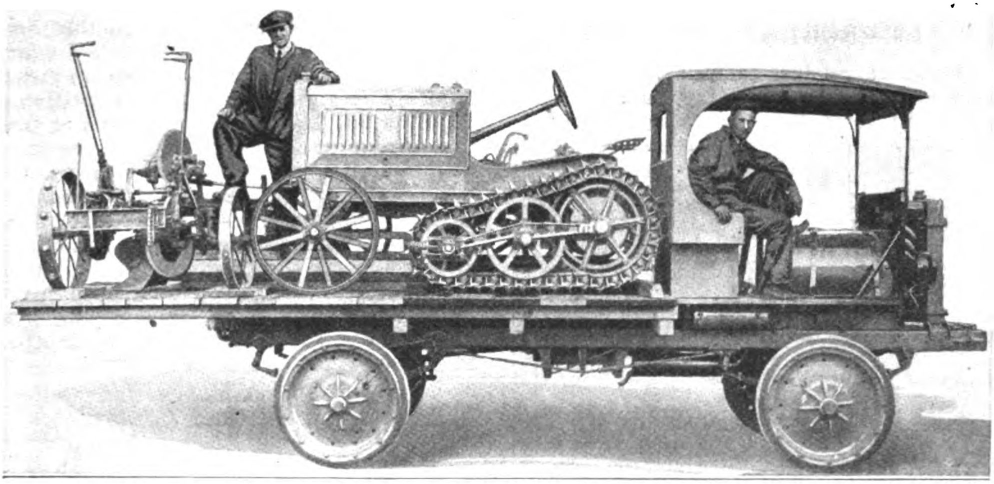
In pre-war times, when the amount of breakage was small and the weight of shipments was not an important factor, the use of plates in X-ray work was extensive. But the necessity of sending large supplies to France and the carrying on of X-ray work under field conditions soon caused them to be replaced by films. The use of films in automobile surgical units made it possible to X-ray wounds as soon as received, which was of especial advantage in army medical work. The sudden cessation of hostilities, however, left the medical department with large quantities of film on hand, and in order to dispose of it, the surgeon-general has ordered the use of film in this country in place of plates.

SIMPLE PRESSURE REDUCER FOR FIRE HYDRANT

Of late the San Francisco fire department has adopted a reducing valve that enables the city's high-pressure water system to be used as the main fire-fighting arm, instead of being retained chiefly as an auxiliary for great emergencies. Perhaps it is not generally known that San Francisco, following its ruinous conflagration some years ago, established, at an expense of nearly $6,000,000, a high-pressure system as a safeguard against a recurrence of such a disaster. One of the high-pressure hydrants is said to be equal to several fire engines. The force is so great that, if used in combating ordinary blazes, the water would do more damage than the fire. Therefore it was called into service at only 83 out of 3,100 fires in 1917, although maintained at an annual cost of $300,000.



A Reducing Valve Allows San Francisco's High-Pressure Water System to be Used for the Fire Department's Everyday Work. The Valve is Seen Mounted on a Hydrant at the Left. In the Center Are the Piston and Valve with the Pressure-Indicating Rack. The Fireman Supports the Valve with a Strap When Connecting It



The Big Motor Truck Carries the Tractor and Plow to Any Farmer Who Wants a Demonstration, a Special Platform being Fitted to the Truck, and Four Three by Twelve-Inch Planks Used as a Loading Runway

The new pressure-reducing valve enables water to be taken from the heavy-duty hydrants at whatever pressure the occasion dictates. It is operated hydraulically. Heavy springs and delicate mechanism, customarily utilized in such automatic valves, are not embodied in it.

In brief, the apparatus consists of an ingenious arrangement of internal chambers, a piston valve at the intake, and a governing spring-operated needle valve fitted with an indicator and graduated rack. The piston has a central bore that permits high-pressure water to flow to a chamber at the top of the casting, from which its passage to a control chamber is regulated by the needle valve—set to hold any desired pressure. It is essentially the variation of pressure between that in the latter chamber and the discharge and back-pressure chamber that actuates the piston valve.

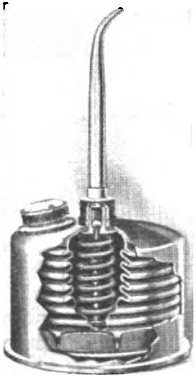
CONCRETE PUT TO NOVEL USE IN SHIP REPAIRING

What may prove to be a new era in ship repairing has been inaugurated by a Buenos Aires firm. A wooden vessel of some 200 tons displacement, with ribs quite rotted away at the bottom, was reinforced by new concrete ribs being cast between the existing wooden ribs. These were secured to the skin of the vessel by means of screws being driven into the latter and the concrete set around them. The concrete also serves as ballast, hence nothing is added to the weight of the vessel. The repair was quite successful.

DEMONSTRATING FARM TRACTOR CARRIED ON TRUCK

When a farmer in his district is ready for a demonstration, a tractor distributor in Salt Lake City simply loads the tractor and plow on a big motor truck and goes out to the field. Four 3 by 12-in. planks, which are taken along, make a runway up to the truck platform, specially built for its unusual burden. This outfit can stage several demonstrations a day, and the "show me" method proves to be a convincing sales argument.

NEW TYPE OF OILCAN HAS BELLOWSLIKE RESERVOIR



In an attempt to overcome faults in common oilers, an oilcan has been designed having a body of heavy steel, within which is an oil reservoir in the form of a brass bellows. This is kept expanded by a coil spring extending from the bottom to the spout. Oil is ejected by pressing a button on the underside of the can. At the lower end of the spout is a ball check permitting the flow of only a limited amount of oil with each compression of the bottom, thus eliminating one cause of waste.

AERIAL POST CARRIES WOMAN IN REGULAR MAIL BAG

A live parcel was carried by aerial post as regular mail on a flying postman's recent trip from San Diego to Riverside, Calif. Miss Virginia Brassac, a resident of the former city, occupied the mail bag and won the distinction of being the first to travel under that classification. Rockwell Field was the starting point of the flight.

COPYRIGHT, INTERNATIONAL FILM SERVICE

A Young Woman of San Diego, California, Stepped into a Mail Bag and was Sent by Aerial Post to Riverside, 90 Miles Away, the First Human Parcel Carried by a Flying Postman

NEW PHOTOMETER MEASURES LIGHT VARIATIONS

Designed primarily for the purpose of measuring the illuminating value of flash lights, flares, star-shell compounds, and other similar compositions, a photometer originated by a member of the Illuminating Engineering Society of England is of especial interest. It consists of a tube, 25 in. long and 3 in. in diameter, with interior whitened and illuminated by a small electric lamp at one end. Extending nearly the whole length of the tube is a 2-in. slot, which is covered by a thin metal strip with perforations in the form of letters. This strip is painted white and receives the illumination to be measured. The tube being brilliantly illuminated at one end, the perforations at that end appear to be brighter than the strip illuminated from the outside, and those at the other end darker, and a point can be approximated where the interior of the tube is as bright as the exterior strip, thus giving a basis for comparing the known illuminating value of the glow lamp in the tube with that of the outside illumination; that is, the flash light, flare, or other source of light under test.

NEW BRIDGE OVER THE TIGRIS A MARVEL OF ENGINEERING

Named after the late Lieut. Gen. Stanley Maude, K. C. B., a new bridge erected by the British over the river Tigris at Bagdad has just recently been thrown open to traffic. Because of the many peculiar conditions this bridge had to fulfill, its designing and construction in seven months is nothing less than marvelous. The bridge had to be capable of bearing the heaviest piece of ordnance being used in Mesopotamia; of automatically taking up the rise and fall of the river; of withstanding the force of its floods, which reach a height of over 20 ft. and travel very fast, and of opening and closing for the passage of river craft with a minimum delay to traffic. The main portion of the bridge, which is 1,159 ft. in length between abutments, is carried on steel pontoons which work in vertical guides. The opening portion, 260 ft. long, is hinged to the girder portion on the left bank and opens upstream. It is operated by power-driven winding gear. The alteration in the length of the bridge, made necessary by varying river levels, is taken care of by ramp girders, the space between them being bridged by a sliding cover plate. To guard against destruction by floods, very heavy mooring appliances are employed both up and downstream.

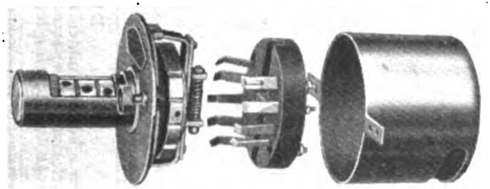
¶To supply the needs of Vienna, a hydroelectric power plant has been erected on the Danube—the first in Austria. The power will be obtained by means of a dam, and the station will have 17 turbines capable of developing from 70,000 to 170,000 hp., depending on the water level.

SCRAP COPPER TO BE SALVAGED FROM EUROPEAN BATTLE FIELDS

When the well-known dogs of war were finally run into their kennels after four years of romping over the greater part of Europe, one of the big questions put up to the experts was, how much of the copper could be salved and made use of. It is estimated that France and Belgium alone have in excess of 3,000,000 tons on their various battle fields, of which probably 1,000,000 tons can be recovered. This is about equal to one year's output of the United States. In addition to this, there are large quantities in Russia, the Balkans, and Italy. Germany is practically denuded of copper, notwithstanding the fact that she went to particular pains to stock up on this metal for several years prior to the war.

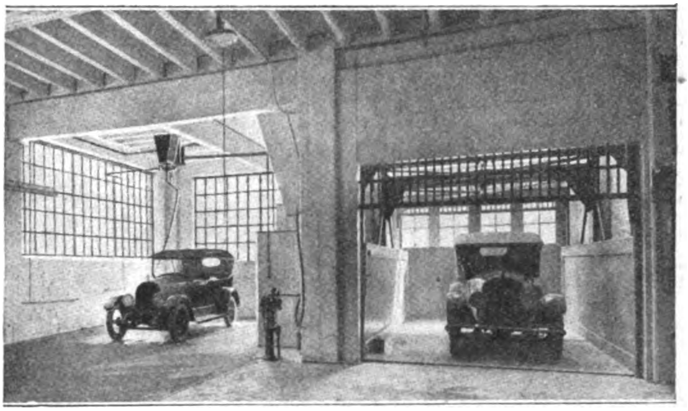
MULTIPLE SWITCH DESIGNED AS KEYLESS AUTO LOCK

One of the season's new motor-car locks has been designed on the theory that few automobiles are stolen by expert electricians. The device consists of a simple combination lock and multiple switch, assembled in a compact unit, with its mechanism inclosed in a steel housing mounted within the cowl. It controls the entire electric equipment of a car, but allows the tail and dash lights to be operated independently, if desired. The combination may be changed at will, and its use, of course, eliminates the nuisance of the misplaced key or the possibility of a duplicate.


This Locking Switch Controls the Ignition and Lighting Circuits of a Car, Making Theft Difficult. The Combination can be Easily Changed

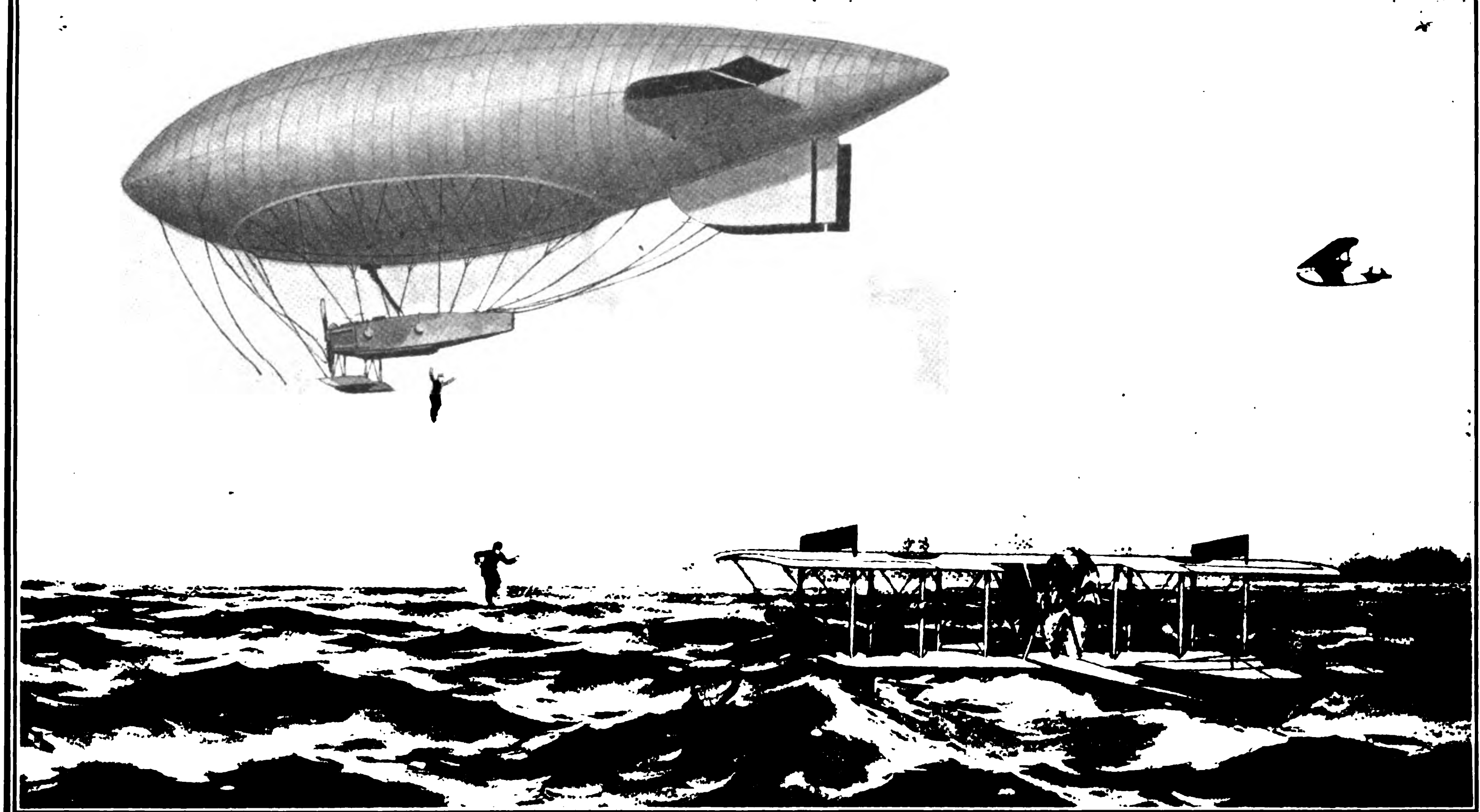
AUTOS GET SHOWER BATH IN THIS REPAIR SHOP

When an automobile is first brought for attention into the repair department of an Indianapolis car factory, it is given the same treatment often accorded to other "knights of the road" on entering a lodging house. A shower-spray arrangement attached to the shop ceiling thoroughly washes down the dusty wanderer until, clean and fresh, it is sent to the elevator and carried upstairs to the workroom.


The Object Depending from the Ceiling Just over the Car at the Left Is a Shower Spray, Which Quickly Removes Dust and Dirt. After Its Bath It Takes the Elevator at the Right

CONCRETE RAILWAY SLEEPERS GIVE GREATER RESILIENCY

An Italian railway constructor has recently devised and tried out, on a railway running between Asti and Altavilla, a series of interlinked sleepers of reinforced concrete. These are triangular in shape and are arranged lengthwise beneath each rail. As each of them rests on a pedestal with the center of its base, it is the claim of this constructor that they are capable of a rocking motion which gives a certain resiliency to the rail. Each sleeper supports the rail at two points, and here a block of wood is used as a cushion, with a bolt for anchoring the rail to the sleeper. The rails are held to gauge by means of tie-rods. These tie-rods are fastened to the rail by clamps that grip the base, thus doing away with the necessity of drilling the rail. Unevenness of track level may be rectified by changing the height of the wooden cushions between the rails and the sleepers. Maintenance expense is comparatively small.

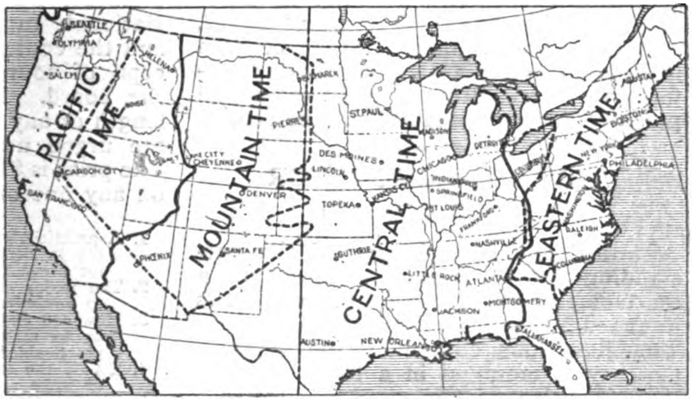


DIVE FROM BALLOON INTO SEA IS UNPLANNED FEAT OF FOUR OFFICERS

HIGH diving from a balloon undeniably has a sporting flavor; but it was with no athletic intent that four officers from the Naval Aviation Camp at Chatham, Mass., performed the spectacular feat. In mid-air their engine became hopelessly stalled and the big craft started out to sea. Desperate maneuvering brought it low enough for a daring leap to the water. Then, while a following seaplane rescued the men, the big bag soared away in the distance.

NEW STANDARD-TIME ZONES ESTABLISHED BY LAW

The establishing of new standard-time zones by the Interstate Commerce Commission the first of the year, as provided by law, has caused the resetting of many timepieces in cities on or near the altered dividing lines. The western boundary of the eastern zone, for most of its length, has been moved westward, as the accompanying map indicates. The new line dividing the central and mountain zones now follows the 100th meridian in place of the old and very irregular boundary. The plan of the commission is that all towns directly on this meridian shall use central time. This applies also to the majority of the municipalities on the eastern border of the central zone. Practically the whole of Utah, Idaho, and Nevada, and nearly half of Montana have been transferred from the mountain zone to the Pacific zone. The old boundaries were never recognized as official by the government, but the new ones are.



The Eastern Time Zone has been Extended Westward, as the First Heavy Line from the Right Indicates. Between Central and Mountain Zones the Boundary Now Follows the 100th Meridian. The Pacific Zone Takes In Practically All of Utah, Idaho, and Nevada, and About Half of Montana

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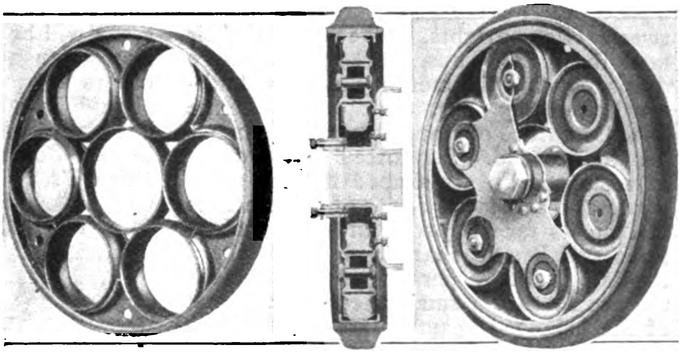
THREATENED POWER SHORTAGE OFFSET BY CONSOLIDATION

The development of a situation which for a time threatened to cause a serious loss of power to California industries has just been averted by the consolidation of three large hydroelectric systems. By this means electric power manufactured near the California-Oregon line is transmitted continuously for a distance of 300 miles to the industrial region around San Francisco Bay. There has heretofore been a large surplus of power in the northern part of the state which was unavailable, and it is expected that approximately 60,000,000 kw.-hr. of power will be brought annually from there to the rapidly increasing industrial districts of middle California. This will, in turn, bring about the saving of some 20,000 bbl. of oil, which is now being used for the generation of power. Industries of central California are thus assured of development unhampered by lack of adequate motive power.

HEAVY TRUCK WHEEL FLOATS ON RUBBER CUSHIONS

Adding to the resiliency of the solid-rubber tires used on motor trucks is an attractive field for the exercise of ingenuity. Most of the attempts, however, depend upon steel springs, which in this connection are apt to be a source of trouble. The steel framework of a new type of truck wheel is supported by six round rubber cushions which, with their inclosing rings, fill the space between the regular ring of the wheel and the center

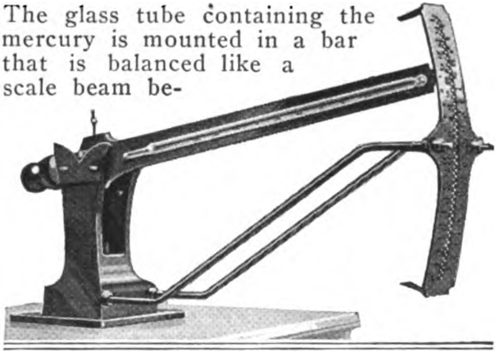


At the Left Is the Steel Frame of the Wheel, Before the Cushions are Inserted. In the Center Is a Section through the Vertical Diameter of the Finished Wheel, Showing How the Axle Is Floated on the Rubber Cushions, While the View of the Complete Wheel at the Right Gives an Idea of Its Appearance

or hub ring. Side plates in the form of solid spiders bolt to the center of each rubber cushion and are seated on the hub. The axle has no connection with the frame of the wheel except through the rubber cushions, making, in automotive parlance, a "full-floating" wheel. As the entire periphery of each cushion is inclosed by the frame, resilience is offered to shocks from any direction and pressure is distributed around the rim.

NOVEL THERMOMETER FOR THE BLIND

Marked simplicity is one of the outstanding points of interest found in a thermometer of French invention that is intended for the use of the blind. The glass tube containing the mercury is mounted in a bar that is balanced like a scale beam between two uprights. The bulb end is near the axle. Thus, as the temperature drops, causing the mercury to move bulbward, the beam rises. An opposite change of temperature obviously causes the member to descend. Supported at its outer extremity is an arc-shaped flexible piece of metal that bears a series of perforations and on its face is provided with graduations and Braille characters. To make a reading, a blind person presses against the arc so that a small needle at the end of the balanced beam enters the perforation with which it is in alinement. Then locating the latter by touch, and translating the characters opposite it on the arc-shaped dial, the temperature is determined.



BY COURTESY OF LA NATURE

An Ingenious Thermometer of Marked Simplicity Intended for Persons Who Are Blind

❡Canada's Royal Northwest Mounted Police, celebrated in fact and fiction, are to be reorganized on the pre-war basis of 1,200 men. The "Scarlet Riders," as they were also called, were almost disbanded by wholesale enlistment of their members in the overseas army.

OFFER BIG PRIZE FOR ESSAY ON WORKERS AND WAGES

A thoughtfully prepared essay on one of the subjects outlined here may win a good prize for its author. The donor is the National Industrial Conference Board, and the contest is open to everybody except, of course, persons connected with the board. No limit is placed on the length of any paper, although contestants are urged not to be unduly expansive. The prize is $1,000 for the best monograph on any one of these topics:

1. A practicable plan for representation of workers in determining conditions of work, and for prevention of industrial disputes.
2. The major causes of unemployment and how to minimize them.
3. How can efficiency of workers be so increased as to make high wage rates economically practicable?
4. Should the state interfere in the determination of wage rates?
5. Should rates of wages be definitely based on the cost of living?
6. How can present systems of wage payments be so perfected and supplemented as to be most conducive to individual efficiency and to the contentment of workers?
7. The closed union shop versus the open shop: their social and economic value compared.
8. Should trade unions and employers' associations be made legally responsible?

Each competitor is to sign an assumed name to his paper and send his real name and address separately in a sealed envelope with the assumed name written on it. Especial weight will be given to composition and skill in handling the subject, and the copyright on the prize-winning essay will be retained by the board, which may arrange with authors for the use of others not awarded a prize. Manuscripts should be addressed to the National Industrial Conference Board, 15 Beacon Street, Boston, Mass., and marked "For Prize Essay Contest, in Industrial Economics." They must be mailed on or before July 1, this year.

ANY CIVILIAN MAY FLY NOW IF QUALIFIED

Any civilian who is ambitious to join the ranks of the peace-time fliers, professional or amateur, now has only to prove his qualification and he can get a permit. Military restrictions no longer apply to the licensing of civilian pilots under the presidential proclamation of Feb. 28, 1918. Applications are handled by the Joint Army and Navy Board on Aeronautic Cognizance, Building D, Sixth and B Streets, Washington. Lieut. L. G. Haugen is secretary of the board.

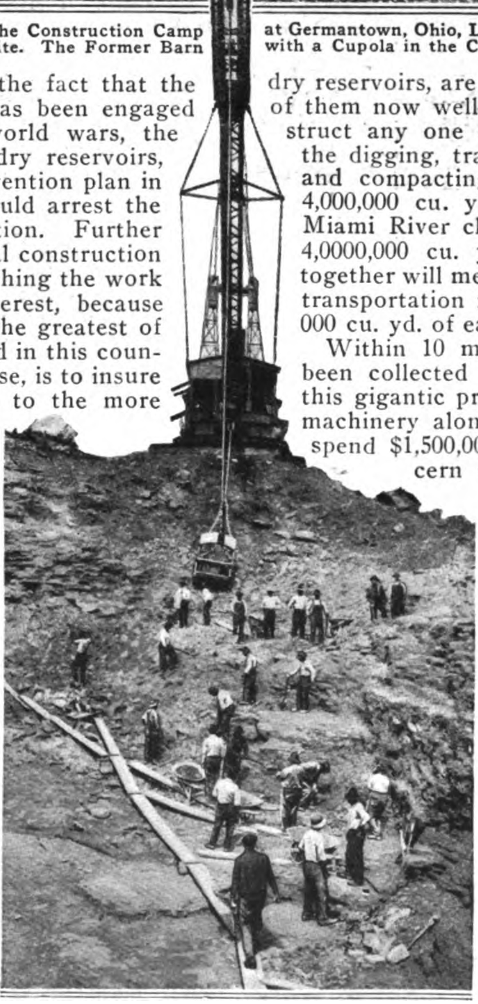
BIG DRY RESERVOIRS TO PROTECT MIAMI VALLEY AGAINST FLOODS

BY HOWARD EGBERT

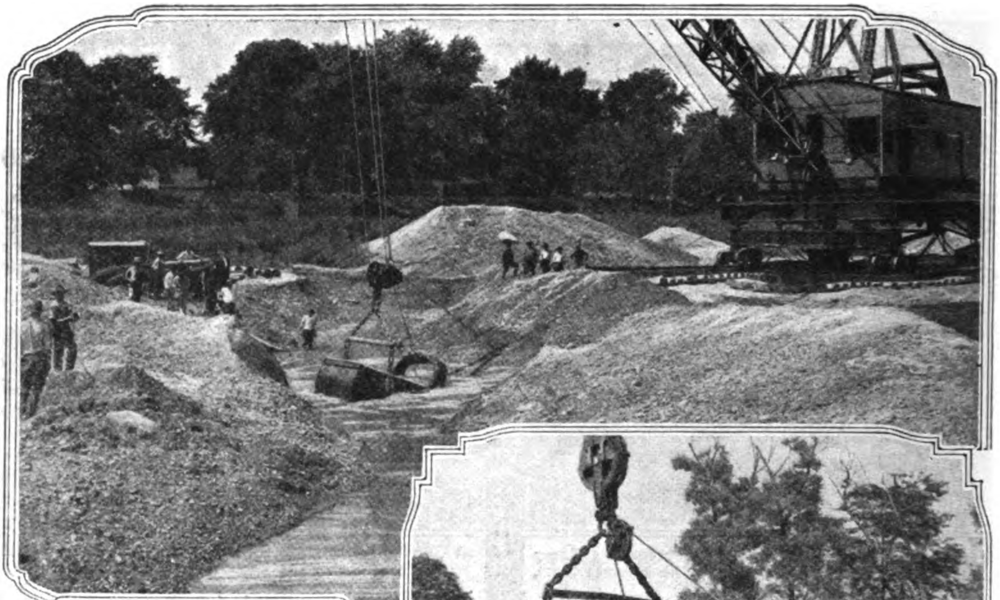
This Little Settlement Is the Construction Camp at Germantown, Ohio, Looking East from the South End of the Dam Site. The Former Barn with a Cupola in the Center Is the Office

WERE it not for the fact that the United States has been engaged in the greatest of world wars, the building of the five dry reservoirs, as part of a flood-prevention plan in the Miami Valley, would arrest the attention of the nation. Further than that, international construction experts would be watching the work with considerable interest, because the project is by far the greatest of its kind ever attempted in this country. The plan, of course, is to insure permanent protection to the more than 700,000 inhabitants living in the Miami conservancy district, a region following closely the Miami River, an important but not navigable waterway which threads its way through southern Ohio counties. The cost is estimated at $20,000,000. More than 2,000 men are required to complete the construction work, and three years as a minimum is the length of time estimated as necessary to carry out the designs of the district. Five huge retention basins, or dry reservoirs, are being constructed, all of them now well under way. To construct any one of these dams means the digging, transporting, depositing, and compacting of from 850,000 to 4,000,000 cu. yd. of earth. For the Miami River channel the estimate is 4,0000,000 cu. yd. Dams and river together will mean the excavation and transportation in all of some 13,000,000 cu. yd. of earth.

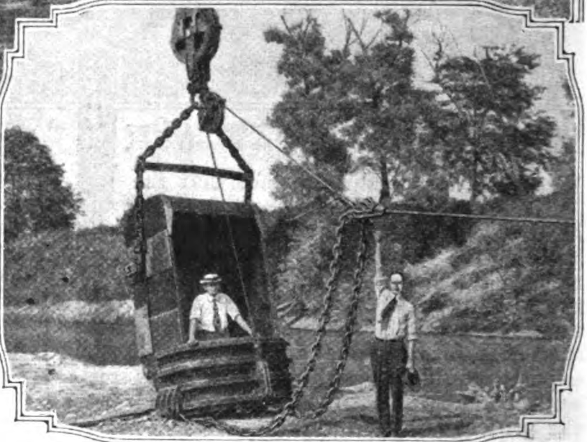
Within 10 months, machinery has been collected and work started on this gigantic project. For the larger machinery alone it was necessary to spend $1,500,000. The chief concern of the engineers who planned this undertaking was machinery for excavation and transportation. The hydraulic dredge was selected as the most suitable means for work along the river. By this method the earth, together with about 10 times its volume of water, is picked up by the suction of the dredge pump. The mixture is lifted by the pump to the desired point, the water permitted to run away, leaving the earth. For the greater part of

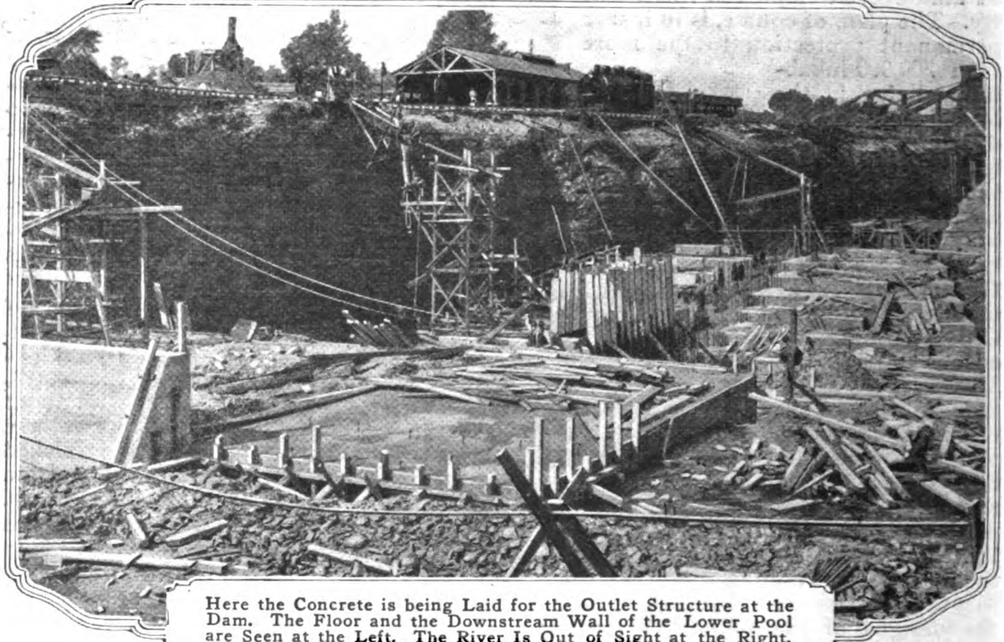


Beginning Work on One of the Dry Reservoirs with an Electric Drag-Line Excavator

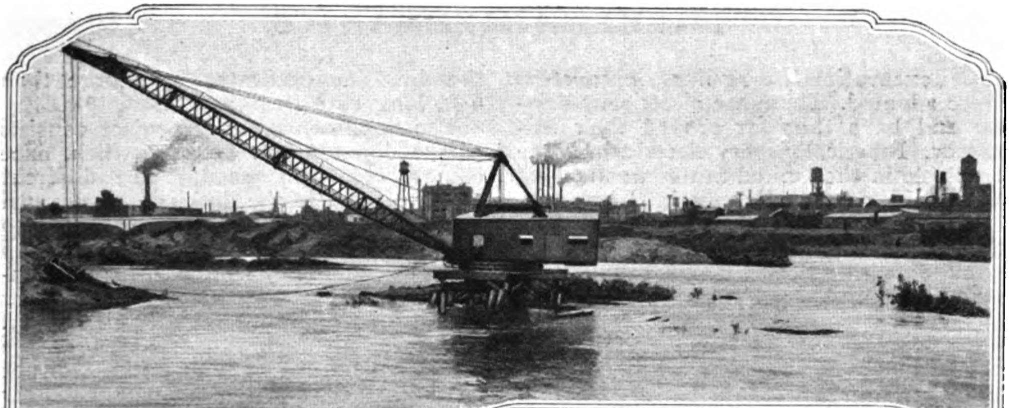


The Picture Above Shows How the Drag Line is Used in Digging a Trench—in This Case in the Bed of the Miami River, at Dayton, Ohio. The Bucket is Manipulated to Build a Dam on Each Side and across the River End of the Trench. At the Right Is One of the Big Buckets, Held Erect by Its Hoisting Cable. This Is a Four and One-Half Yard Bucket





Here the Concrete is being Laid for the Outlet Structure at the Dam. The Floor and the Downstream Wall of the Lower Pool are Seen at the Left. The River Is Out of Sight at the Right, Which Is the Upstream Side



A Swift Rise of Water, Characteristic of the Miami River, Caught This Drag-Line Machine and Serves to Illustrate the Hazards of the Work. These Drag Lines Pull Up Three Wagon Loads of Earth at a Time

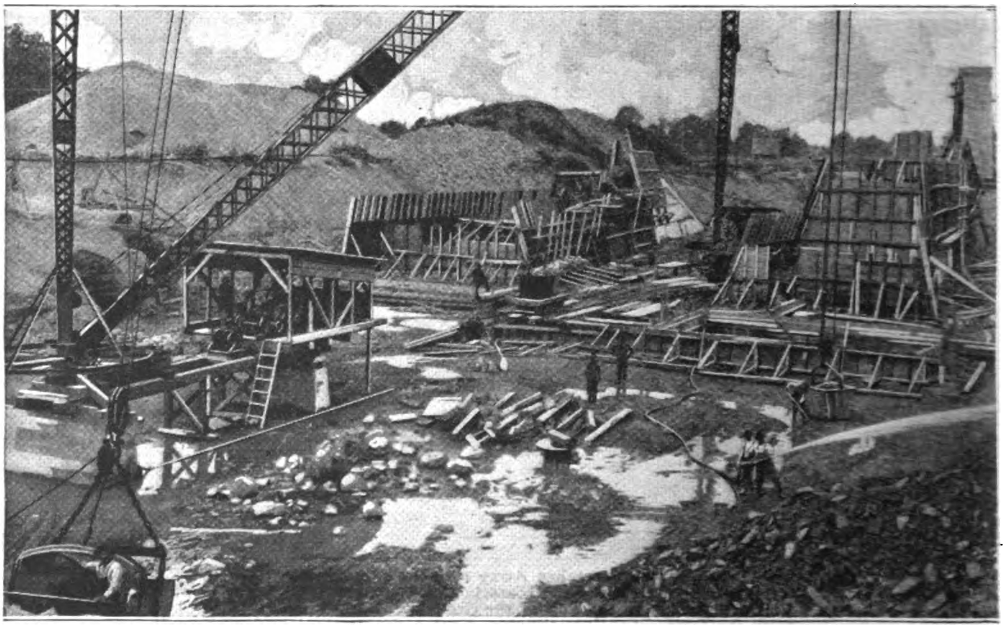
The Huge Structure across the Stream Is a Concrete Mixer at Work on Material for the Reservoir Basins and Retaining Walls. The Supply Railroad Runs along the Other Side of It, and a Conveyor Takes the Material up the Incline

The Track Which Stretches Away into the Picture was Built to Bring In the Machinery and Materials for the Dam. The Inclined Platform Leads to the Top of the Gravel-Washing Plant. **Gravel from the Cars Goes into the Hopper at the Bottom and up a Conveyor Belt** the excavation drag-line excavators were adopted. These are electrically driven and have thus far proved their efficiency. Practically every electric drag line available in the United States was bought up for this construction work. Engineers, in one instance, had to wade through four feet of snow in northern Michigan to find a suitable electric drag line available in that section. To get it to a railway and ready for shipment to Dayton, Ohio, a gang of men shoveled snow, six feet deep, for four days for a quarter of a mile with the thermometer 35° below zero. Two machines were lifted from swamps in southeastern Mississippi. In all, 18 excavators of this type were bought at an expense of $425,000. Eight of them are operated by steam.

In carrying on the work, six small three-ton gasoline locomotives, of 24-in. gauge, for handling concrete in making the dry reservoirs, or dams, were purchased, and to be used with these, 81 standard 12-yd. dump cars were taken over. For the concrete itself, a dozen hopper cars were found necessary. To carry water for the hydraulic fill at the dams, 12,000 ft. of steel pipe will be required. Five gravel-washing plants were erected at the sites of the five dams, and special electric lines had to be built from a Dayton plant to furnish the motive power for operating the machinery. The buckets used with the drag-line excavators are more than 6 ft. long by 4 ft. in width.

The flood-conservancy project consists of the dry-reservoir system, which, once constructed, will occupy five different tracts of land in the district. At unusual periods of high water, it is designed to permit all overflow water to run into these basins. They will be so stoutly constructed that they cannot break under pressure of millions of gallons of water. The river channel, thus relieved of the additional burden of high water, will not be threatened, and the customary danger of banks breaking or overflowing is entirely eliminated. The dry-reservoir plan was originated by chief engineer Arthur E. Morgan, who has worked on the project with a corps of assistants since 1913. One of his chief aids is Charles Paul, who built the great Arrow Rock Dam in the West.

A feature of the work is the purchase by the conservancy district of the village of Osborn, in Greene County. The entire population will soon have to move, because the village occupies the site of an important part of the flood-prevention work. This is the first time in the country's history that a project has been large enough to warrant the purchase of a village of 500 inhabitants. Railroads and traction lines have been obliged to move their tracks in keeping with the plans.



The Foreground Is Level Bedrock, Which Needs Only to be Washed Clean, and the Heavy Concrete Walls, Going Up in the Background, are Built Directly Upon It, 88 Feet High

It will require as much concrete to complete the dams as was used in the building of the Panama Canal. One hundred skilled engineers are being employed. Charles H. Locher, a construction engineer of national prominence, is in direct charge of the entire construction work. Scores of cottages, and also schoolhouses, have been erected at the various dam sites for the workmen and their children.

CONCRETE TRACK BASE WITHOUT BALLAST

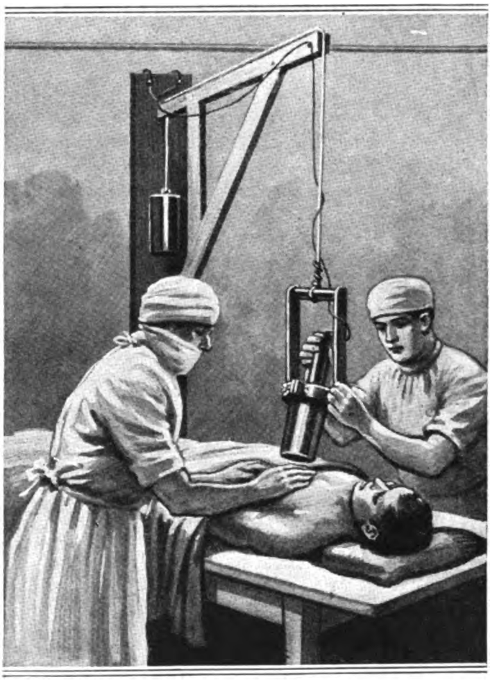
A concrete track base is being successfully used without ballast, on a short stretch of open main line, by a western railroad. A continuous concrete slab, 8 ft. wide, with wood cushions for the rails, is the salient feature of the arrangement. The thickness varies, for experimental reasons, from 16⅜ in. to 24 in. Also as an experiment, both continuous timber bearings and short wood blocks were used under the rails on different sections. The concrete was molded in bottomless forms on the well-tamped roadbed, at a point where it runs through a gravel cut, and no ballast was used. The wood cushions for the rails are screwed to wood sills, imbedded in the concrete. Although the concrete base is continuous with the track, ⁹⁄₁₆-in. expansion joints, cushioned with asphalt, are provided by molding the slabs in lengths of 16 ft. 5½ in. The ends of the slabs are mortised to guard against side shifting. It is agreed that the concreted track rides more easily than adjacent tracks of usual construction, and maintenance is low.

NIGHT GOGGLES FOR AUTOISTS DIM GLARE OF HEADLIGHTS

Special goggles have recently been invented for the convenience of motorists who, driving at night, are frequently blinded by the glare of lamps of passing cars that are undimmed. A portion of the left-hand part of each lens in these goggles is colored, and when the wearer approaches a blinding light, he has only to turn his head slightly and the rays are dimmed by the shaded portion of the glass, while the remainder of the field of vision is viewed through clear glass.

PIECES OF SHELL IN WOUNDS LOCATED WITH VIBRATOR

Locating pieces of shell, or the like, in a wound is much facilitated by using an electric vibrator, recently developed in France and said to possess advantages over X-ray apparatus employed for similar purposes. The vibrator is suspended by a cord passing through a pulley at the end of a swinging arm, so that it can be brought directly over the operating table and raised or lowered as desired. It is operated by an alternating current or, where that is not available, a commutator is employed, and a quick-action interrupter is also necessary. As the examining surgeon moves his hands over the flesh in the vicinity of the wound the vibrator is held close to the back of his hands by an attendant. When the surgeon's fingers touch a place close to the imbedded fragment he feels a distinct vibration of the muscles.

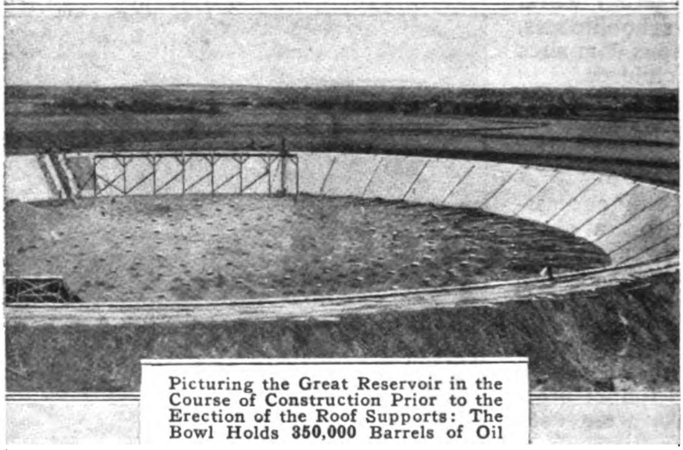


The Surgeon Moves His Hands over the Patient's Body, and the Electric Vibrator Aids in Locating Imbedded Steel Fragments by Its Magnetizing Effect, Which Causes the Overlying Muscles to Vibrate

¶According to recent action of the French government every discharged poilu is to have his steel helmet as a permanent souvenir of his part in the war.

CONCRETED EARTHEN BASIN BIG OIL RESERVOIR

Shortage of steel has caused reinforced-concrete to be used in the construction of a 350,000-bbl. oil reservoir near Gainesville, Tex. The type is found in California fields, but is new in Texas. It consists of a circular basin floored with three inches of wire-strengthened concrete and covered with a concrete roof supported on timber posts and girders. The bowl was provided by making a 5-ft. excavation to a limestone stratum, and throwing up an earthern embankment, 17 ft. in height. By tying together the wiring in the roof and slope slabs, and connecting the pipe lines likewise with the roof reinforcing, precaution has been taken against fire being caused by lightning.



Picturing the Great Reservoir in the Course of Construction Prior to the Erection of the Roof Supports: The Bowl Holds 350,000 Barrels of Oil

The Photograph Above was Taken When the Roof of the Storage Basin was Nearing Completion. The Reinforcing Wires in the Cover and Slope Slabs are Tied Together and Also Connected with the Pipe Lines as a Precaution against Fire being Caused by Lightning

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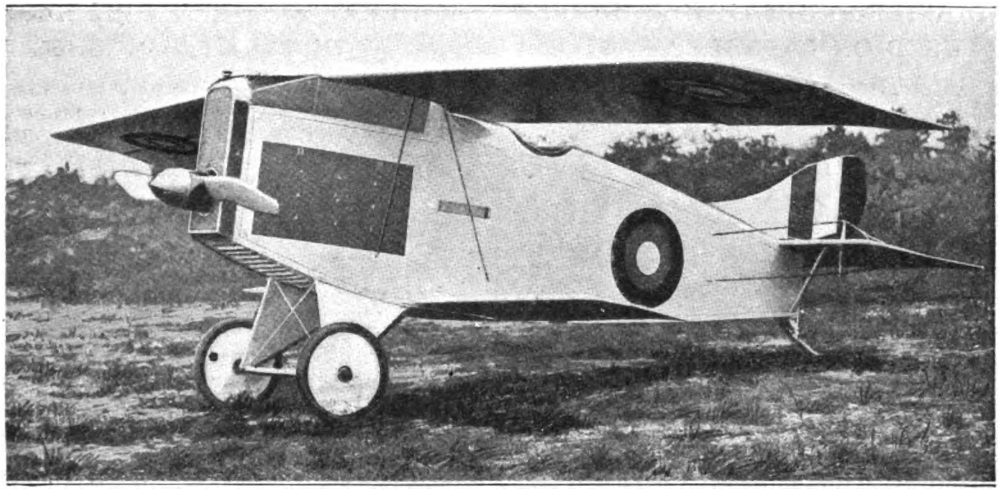
ℭThe Dutch government has contracted for a powerful radio station which will enable Holland to communicate by wireless with Java, a Dutch possession, which is to have a sister station.

SMALL OUTPUT AND BREAKAGE MAKE SHORTAGE IN DISHES

A war hardship which America escaped by a narrower margin than has been generally realized was a pronounced scarcity of china and porcelain ware for table use. Had the war continued for some months longer many low-priced restaurants probably would have been forced to use enameled or paper dishes. Two factors brought the market in this country to this critical condition, which has not been altogether relieved by the signing of the armistice. On the one hand, production was greatly curtailed in France and to a less degree in England, and many shipments were sunk on their way to this country. Many firms found that it took a year or more to get orders filled in England, while formerly it had taken about six months.

The second factor contributing to the shortage was the increased breakage due to inefficient help in hotels and restaurants, and also to inferior quality of material. Even the normal breakage in public eating establishments is so great as to appall one unfamiliar with the business. The manager of one of the largest concerns in the country operating a chain of lunch counters and restaurants found that when help was most difficult to obtain the breakage ran away above normal. Of late the condition has improved somewhat, but still the breakage loss has been in the vicinity of $4,000 per month. While this concern had less delay than many in receiving shipments from England, the general shortage was reflected in prices it paid. Cups that formerly cost $1.35 per dozen rose to $2.90 per dozen. Butter chips which once cost 18 cents per dozen have been selling for 80 cents per dozen, while glasses that were 35 cents per dozen advanced to 95 cents.

In a typical Chicago cafeteria, when



The Fastest Thing with Wings: The Christmas "Bullet," a Strutless Biplane That has Developed a Speed of 195 Miles an Hour in Flight. Both in Design and Performance, This Is One of the Most Striking Aeroplanes of American Invention

help was hard to obtain, the breakage mounted to $8 per day. Now, with prices not materially different, the grade of help is improved, and breakage has been reduced to $5 per day. One of the leading clubs of the same city finds its breakage bill now averaging $15 per day, as against $8 before the war. The club manager rates his help above the average and attributes this increase almost wholly to higher prices. While conditions throughout the countrv are still far from normal, dealers no longer fear that enameled ware and paper cups will have to be resorted to.

FLEXIBLE, STRUTLESS BIPLANE TRAVELS AT ENORMOUS SPEED

From the standpoint of the spectacular, there is nothing in the aeronautical world that can approach a new American biplane known as the Christmas "Bullet." It is the fastest thing with wings, and in many ways the most astonishing. In flight it has attained the tremendous speed of 195 miles an hour—which is about 50 miles an hour swifter than the record-breaking Loening monoplane.

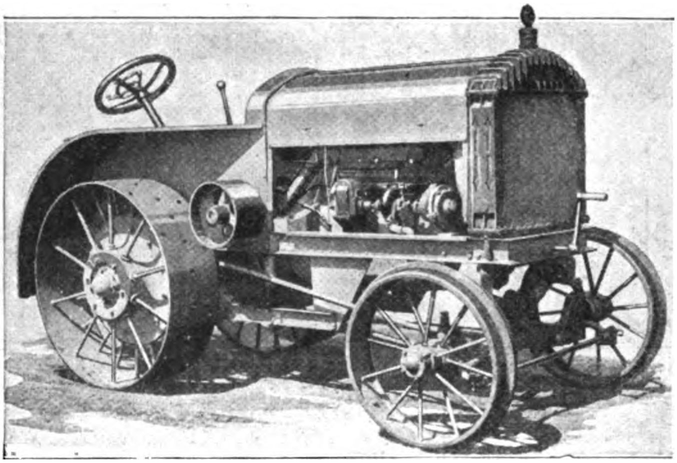
In design, the "Bullet" is as daring as its performance is remarkable. It is absolutely strutless and does not even employ bracing wires. Its wings have almost birdlike flexibility. They are supple, resilient, and self-adjusting. They are able to bend in three separate planes, which supposedly allows the craft to maintain its equilibrium automatically in any kind of weather and makes it less subject to the racking effect which results in rigid machines when shocks are encountered in the air. When at rest, the wings droop in a negative dihedral, while in flight they can assume positive and negative amounting to 18 in. from horizontal in either direction. Obviously this gives the wing tips a 3-ft. range of flexibility, so that it is not departing from fact to describe their motions as birdlike.

Some of the "Bullet's" specifications are interesting. The span of the top plane is 28 ft., and that of the bottom one, 12 ft. The chords are 5 ft. and 2½ ft., respectively. The angle of incidence amounts to three degrees, the gap, 4 ft., and the length of the fuselage 17¼ ft. A six-cylinder Liberty motor of 185 hp. is used. The landing speed is 60 miles; three-quarter throttle speed, 175 miles, and extreme normal speed, 197 miles an hour. Contrary to what one might expect from performance, the machine is not light. It weighs, when loaded, 2,100 lb., which means a wing load of 12 lb. to the square foot.

An accident, which is reported to have killed the pilot and badly injured the plane some weeks ago during a test flight, would seem to indicate that the craft has a low factor of safety. The designer, however, makes claims to the contrary. Several machines of the type are being manufactured for foreign shipment, and the construction of a giant model, with wing spread of 180 ft., and four motors aggregating 3,000 hp., is planned for a nonstop transatlantic flight. It is to be a land machine, unequipped for making a descent at sea.

DOUBLE-REDUCTION PRINCIPLE USED ON CAPABLE TRACTOR

Interesting mechanical features are found in a tractor of recent introduction.



Motor-Car Control, Double Gear Reduction, and Direct Drive in Second, or Plowing, Speed Are Some of the Interesting Points of the New Tractor. The Rear Axle Construction Gives It a Gear Ratio of 50 to One

It is estimated, for instance, that the drawbar pull on direct drive is at least 20 per cent greater than that of other machines of similar horsepower. This advantage is gained through a patented rear-axle construction of double-reduction principle. The arrangement gives a gear ratio of approximately 50 to 1. A worm gear drives a jackshaft, whose pinions mesh with internal gears on the bull wheels. Every working part is in an oil and dust-proof housing. With a four-cylinder, 28-hp. motor, the tractor, weighing 4,500 lb., has a drawbar pull of about 3,000 lb. The transmission is of conventional type except that direct drive is in second, or plowing, speed. The latter is two and a half miles an hour, while high, or road, speed is five miles. The drawbar is of the swinging type and pivoted near the front of the chassis. This prevents the tractor from rearing when under heavy load. The belt speed of the pulley is 2,200 ft. a minute.

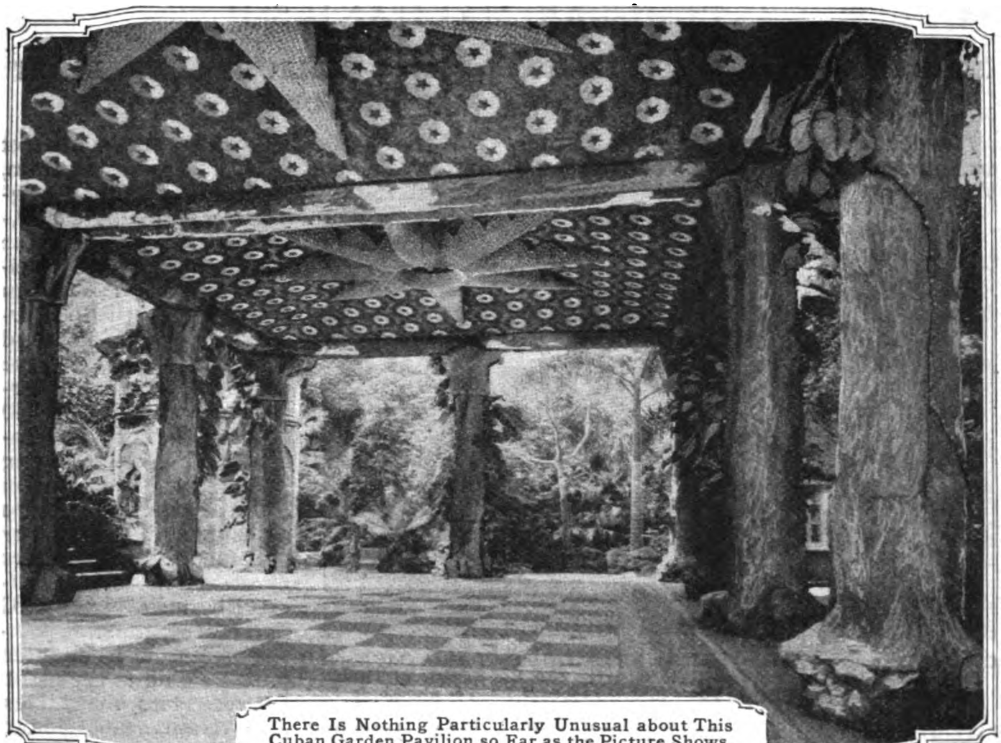
¶In spite of the old adage to the contrary, some things done by halves are done most satisfactorily, as for example the much-used Quinsigamond bridge at Worcester, Mass. Here traffic suffered a minimum of interruption by completing and putting into use one longitudinal half of the new structure before the other half was built.

MINERAL VALUE TEN BILLION IN TWO YEARS

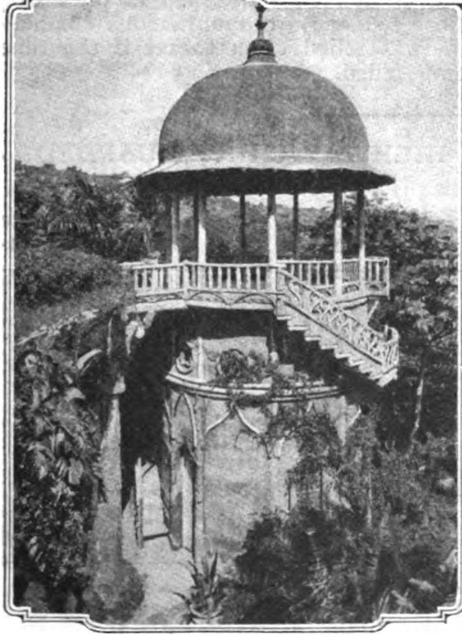
Value of mineral products of the United States for the last two years reached a grand total of over $10,000,000,000. Chief of these products are pig iron, copper, ferro-alloys, lead, zinc, gold, silver, and aluminum, with a figure of $2,091,825,000 in 1917 and over $1,895,000,000 in 1918; and the nonmetallic products, coal, petroleum, clay, cement, and natural gas, reaching about $2,889,000,000 in 1917, and more than $3,265,000,000 in 1918. Alaska's share in this production was $28,900,000 in 1918 and over $40,000,000 in 1917, the falling off being due to shortage of labor, and shipping. Her coal output of 77,000 tons, however, broke all records and is taken to forecast a substantial Alaskan coal industry. The peninsula's chief mineral product, copper, was produced to the extent of 69,426,000 lb. in 1918. Her gold output of $6,100,000 was the smallest since 1904, due to the various influences of the war.

UNUSUAL GARDEN OF CONCRETE RENDEZVOUS AT HAVANA

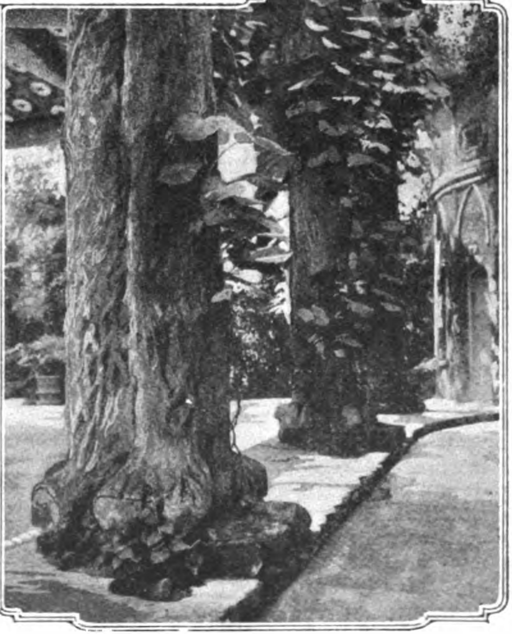
Situated in the midst of rolling hills and tropical splendor, there has been built near Havana of late a recreation garden of singular character. Its oddity consists, not in the purpose to which it is put nor in the style of its architecture, but in the fact that it is constructed almost entirely of concrete. There would be nothing unusual in this were it not for the manner in which the concrete has been used. Inside and out the connecting structures are of rustic design and appearance. The heavy roof of the open-sided veranda, or portico, for instance, is supported by what seem to be the trunks of massive trees, but which in reality are concrete columns of praiseworthy workmanship. From its elaborately tessellated flooring to its inlaid starry ceiling, across which are heavy timberlike beams, it is executed in artificial stone. Only the big-leafed vines that cling to the imitation tree trunks, and the verdure without, are natural.



There Is Nothing Particularly Unusual about This Cuban Garden Pavilion so Far as the Picture Shows. When We are Told, However, That the Entire Structure Is a Work in Concrete—the Tree Trunks, Ceiling Beams, Decorative Inlay, and Everything Else—Its Novelty Becomes Apparent

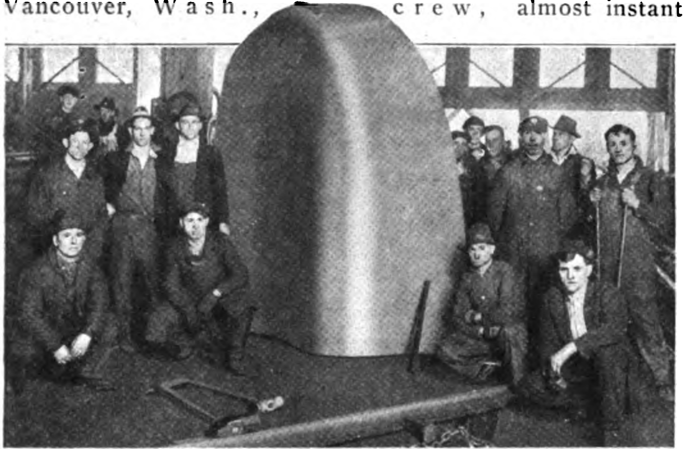


This Is the Picturesque Entrance to the Garden, and despite Its Rustic Appearance, It, Too, is Built of Artificial Stone



Only the Big-Leafed Vines That Entwine the Concrete Trees, and the Greenery That Is Visible in the Background, Are Natural

MAKERS OF BIG BOSS PLATES DO RAPID WORK



Crew of Vancouver, Washington, Men Which Recently Turned Out Eight Boss Plates in Five and One-Half Hours: The Big Sample of Their Speedy Work, Standing in Their Midst, Is for a 9,000-Ton Freighter

A recent record for rapid work in connection with shipbuilding, of which a Vancouver, Wash., crew, making boss plates, is very proud, consisted in turning out eight plates in five and one-half hours. Previously these men had hammered out two plates in a day, and it was thought they had done very well. Some idea of the labor involved in such production can be gained from the accompanying photograph.

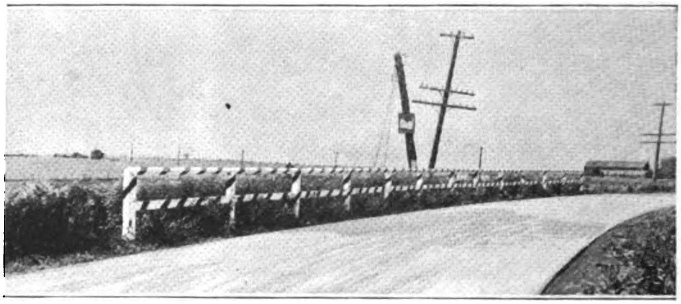
FORTY-MILLION-POUND BLAST NARROWLY AVERTED

Two 500,000-lb. powder magazines set off by the explosion of a powder train, almost instantly followed by other magazines containing 39,000,000 lb. of explosive; the whole city of Philadelphia rocked as if by an earthquake, with enormous loss of life and property; that is one horror of war that America escaped by a scant 90 minutes. The government's big bag-loading plant at Washington Park, N. J., several times threatened by enemy agents, was placed under close watch by secret-service men. At 2:30 one morning a long powder train was shunted onto a siding in the plant, between two magazines. Men searched the train, and found strapped under a middle car, a time bomb loaded with TNT and set for 4:30 a. m. Under the floor of another car was a stick of dynamite wrapped in oil waste, whose tendency to spontaneous combustion was relied upon to act if the time bomb failed.

DISPATCH SERUM BY RUNNERS TO TOWNS IN FAR NORTH

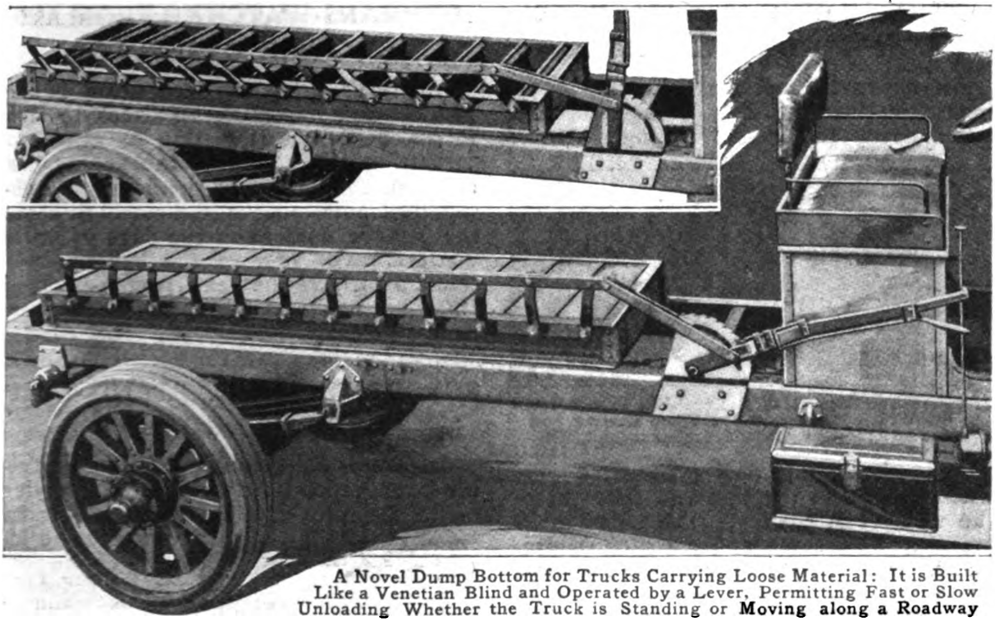
Word has recently been received of the heroic efforts made during recent months to check the influenza epidemic in Yukon territory, where remote communities faced grave danger because of limited medical and nursing supplies. To meet the emergency, Indian runners with dog teams were dispatched from Dawson with anti-influenza serum and sent across the snow as far north as Fort McPherson, near the mouth of the Mackenzie River, making the round trip of 1,000 miles in a little less than two months, which is a fair performance in midwinter. The journey included crossing the Rocky Mountains.

HIGHWAY CURVE GUARDED BY STRIPED FENCE



Motorists Speeding around This Curve in a Concrete Highway near Chicago, Day or Night, can Scarcely Miss Seeing This Guard Rail, Made Doubly Conspicuous by Diagonal Black Stripes

To make a guard rail along a concrete highway near Chicago doubly conspicuous, its white surface has been painted with diagonal black stripes. The barrier is located at the outer edge of a wide sweeping curve.



A Novel Dump Bottom for Trucks Carrying Loose Material: It is Built Like a Venetian Blind and Operated by a Lever, Permitting Fast or Slow Unloading Whether the Truck is Standing or Moving along a Roadway

DUMP BOTTOM FOR TRUCKS SAVES TIME AND LABOR

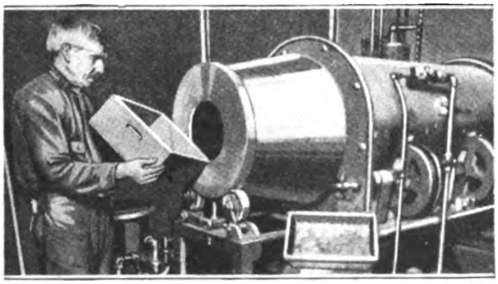
A labor-saving improvement in truck bodies, designed to be applied to any type of motor truck used in hauling materials for road building, and the like, consists of a series of plates forming a bottom that can be dumped by operating a single lever. These plates, or leaves, extend the width of the truck body and, when the bottom is closed, make a tight floor. Each is pivoted off center, and its axle is connected by a lever with a bar extending along the side of the body to an operating lever beside the driver's seat. By shifting this lever the load can be discharged slowly or quickly and distributed along the roadway at the same time. Thus the labor ordinarily required to spread the material is saved.

VACUUM WASHING MACHINE FOR ARMY BLANKETS

As any laundress will testify, washing woolen blankets is hard on the hands, the back, and the blankets. In the British army, the multiplied problem led to the design of a blanket-washing machine. The blankets are placed in a circular galvanized tank with the prepared washing fluid. A vertical spindle carries three vacuum cups which alternately pound the blankets and draw water through them by suction as the spindle rises and falls, driven by an eccentric. A slight rotary motion changes the position of the spindle at each stroke, and a spring gives extra pressure to insure a good vacuum. One machine washes 600 blankets in 10 hours.

FURNACE ANNEALS SHELLS IN VAST NUMBERS

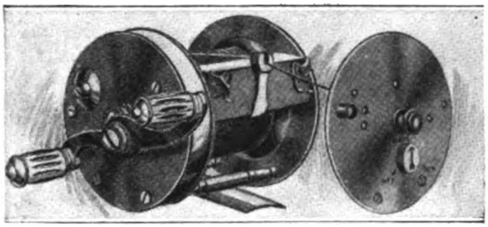
One of the machines which helped make possible the enormous output of ammunition required by our forces during the war, is an automatic annealing furnace which, it is said, is capable of annealing 250,000 cartridges in 10 hours. The time required for the passage of shells from the hopper to the dumping spout varies from six to nine minutes, according to their thickness. The furnace is heated by gas, and its temperature is regulated by a pyrometer.



Feeding Cartridge Shells into a Furnace Which Automatically Anneals Them at the Rate of 25,000 an Hour: The Process Consumes from Six to Nine Minutes

THREE DESIRABLE FEATURES COMBINED IN NEW REEL

An improved reel for fishermen combines the level-winding, free-spool, and antibacklash features in a single article.



This Fishline Reel Has a Level-Winding Attachment, Which Is Inoperative When Casting, and Also Automatically Provides against Backlash

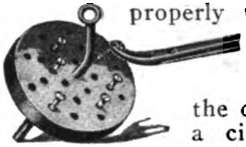
The level-winding device operates only when reeling in the line and falls out of the way when casting. The spool gears are always in mesh and a clutch is provided, which automatically takes hold when winding up the line but lets go when paying it out. The instant the bait strikes the water, the antibacklash mechanism within the reel automatically thumbs the spool. Any tension desired can be secured by adjustment.

¶ Reducing the resistance of negative arc-light carbons by an admixture of 30 to 50 per cent of graphite is found by European investigators to produce a stable arc with high current density at the electrode surfaces. This results in reducing the shadow thrown by the negative electrode.

GERMANS WATCHED FROM AIR BY YANK OBSERVERS

America's army of occupation in the Rhineland is expecting no attack by Hun forces, neither is it resting its arms and forgetting the habits of the enemy. In brief, sausage balloons, with military observers maintaining vigil, float high above the Yankee lines as in the days of active warfare. The first of the balloons was sent up early in the year from the fort of Ehrenbreitstein in the bridgehead zone, near Coblenz.

SURGEON'S SCREW STAND USED IN PLATING BONES

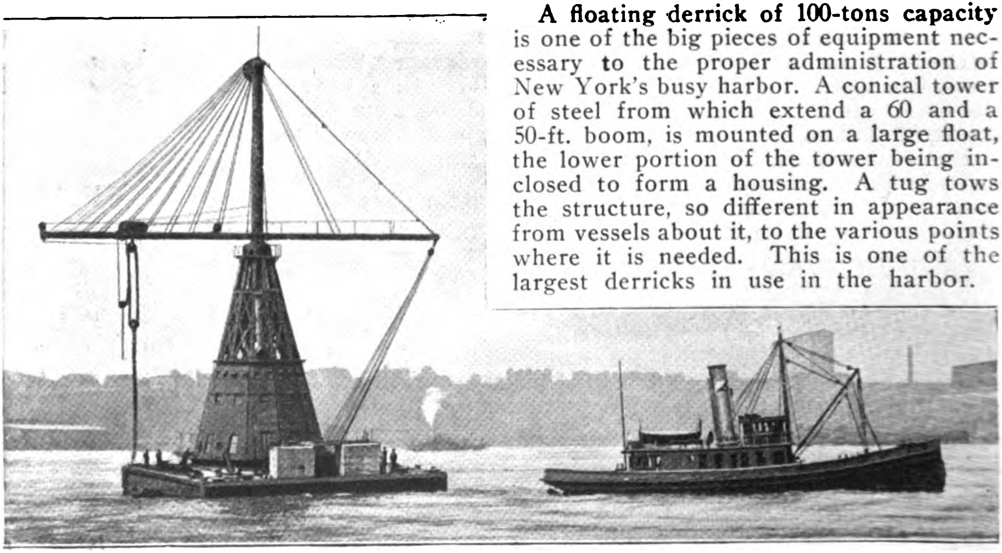


BY COURTESY OF THE LANCET, LONDON

An English surgeon found that in plating bones much time was wasted in trying properly to size each screw preparatory to inserting it in the bone. To remedy the difficulty he devised a circular tilted stand, having shallow holes in its face, in which the screws are set so that they can be easily grasped with a screw holder. The device, with screws in place, is lifted from the sterilizer direct to the instrument table without trouble or loss of time.

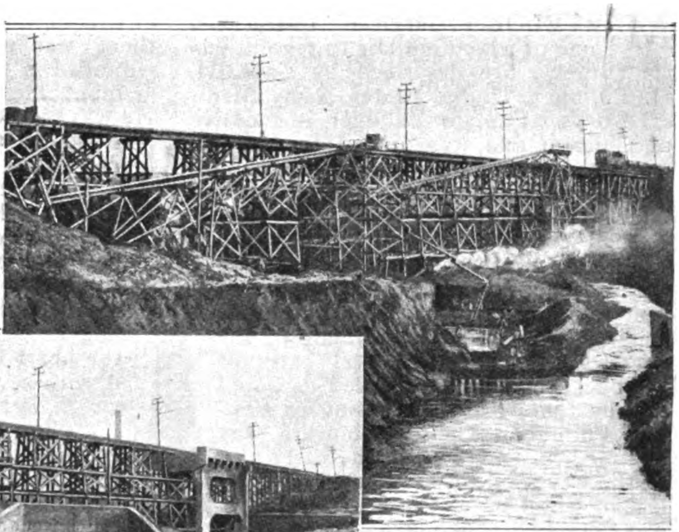
POWERFUL FLOATING DERRICK IN NEW YORK HARBOR

A floating derrick of 100-tons capacity is one of the big pieces of equipment necessary to the proper administration of New York's busy harbor. A conical tower of steel from which extend a 60 and a 50-ft. boom, is mounted on a large float, the lower portion of the tower being inclosed to form a housing. A tug tows the structure, so different in appearance from vessels about it, to the various points where it is needed. This is one of the largest derricks in use in the harbor.

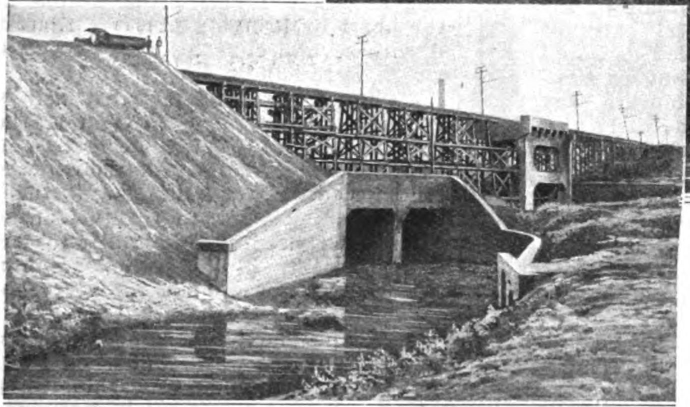


Floating Derrick of 100-Tons Capacity Used around the Docks and Piers in New York Harbor: One Boom Is 60 and the Other 50 Feet Long

RIVER TRESTLE FILLED IN TO EASE PASSENGERS



This Is the Way the 1,000-Foot Trestle Looked Before It was Filled with Earth



The Long Trestle is Shown Here with the Fill Partly Completed and the Kinnickinnick River Flowing through the Finished Concrete Culvert. The Completed Fill will Give the Railroad a Solid Earth Foundation

It is human nature to feel a sense of apprehension while passing over a high trestle, little wider than the track, in a railway coach. The feeling is perhaps aggravated by the smaller size of the interurban electric car. It is not generally supposed that railroad officials recognize this failing, which is practically never the subject of public complaint. An electric interurban road, running out of Milwaukee, Wis., however, is spending about $150,000 to eliminate that very source of discomfort. The crossing of the Kinnickinnick River, approaching Milwaukee, was accomplished over a high trestle 1,000 ft. long. This trestle has now been filled in with earth, so that the tracks, to all intents and purposes, run on a much more substantial-looking ridge of ground. The filling-in process required the use of 100,000 cu. yd. of earth before the trestle entirely disappeared from view. Over the river itself it was necessary to build a huge concrete culvert, through which the Kinnickinnick now flows like a mammoth drain. The culvert is 197 ft. long, 48 ft. wide, and 20 ft. high, and is reinforced by a central partition. Abutments extend for a short distance from the culvert along the river banks, to prevent slippage of earth from the embankment into the bed of the stream. The original trestle was not disturbed, except at the point where the concrete culvert was formed, and its great spidery structure remains to give additional solidity to the new earthen track base in which it is buried. Service over the railroad was not interrupted by the work of filling in, and the passengers now make the crossing at ease, almost unconscious that they have crossed a river and totally unaware of the trestle.

IMPROVED FITTING STOOL FOR SHOE STORE

An improved type of stool for use by clerks when trying shoes on customers is provided with an adjustable rule attached to the foot rest, so that the size of shoe desired can be quickly ascertained by measuring the customer's foot. With the rule permanently attached in this way, there is no possibility of its being mislaid.

¶Steps have been taken to establish a military cemetery in France designated as "The American Field of Honor."

SURGERY'S TRIUMPHS OVER DEATH IN WORLD WAR

By LEWIS T. JESTER

MARVELOUS surgical operations, some of which bid fair to revolutionize surgery, are described by Capt. H. H. Pillinger, United States Army Medical Corps. Captain Pillinger is a native of Chicago and was one of the first 30 American physicians to go to France. He was first assigned to the British forces and later was associated with the great French surgeon Duval. When the American forces reached the front he was detached from the British army and sent to study chest cases under Duval.

These cases, that is, wounds of the heart, lungs, or other vital parts of the chest, had been regarded as hopeless by the British, according to Captain Pillinger. The British were "shy on" medical men, and in the early part of the war took the stand that to treat a man wounded in the heart or lungs was practically risking the life of some less seriously wounded man, one with a better chance for recovery.

For this reason many of the British Tommies who were wounded in the chest at that time—that is to say, seriously wounded—were left to the last on the field of battle. The British army surgeons had all they could do to attend to the more hopeful cases.

"When the American forces began to reach the front in numbers," Captain Pillinger said, "I was called back from the British army and sent up to Doctor Duval to make a thorough study of chest cases. The American army had an ample number of surgeons and physicians, and the authorities wanted to give every man a chance for his life. Doctor Duval had been doing great work among the wounded French, and at that time was, and still is, I believe, the greatest surgeon in the world on what we term chest cases."

Captain Pillinger worked under Duval for some time and was then ordered back to the American front. "While with Duval, he told me and showed me all he knew," He states. "I rejoined the Americans. A few days later an orderly came in while I was operating and told me that there was a man in the next room wounded in the heart. I went in to look at him. The bleeding had all but ceased. He was placed under the X-ray. The picture led me to believe that the ball had lodged in the outer covering of the heart.

"I made an opening in the chest and felt for the bullet. My probing loosened the blood clot, and the blood shot several feet in the air. My glasses were covered with it. I removed them and stopped the flow of blood with my finger. Next, I closed the wound in the heart by bringing pressure against it with several clips, a kind of forceps, which were handy.

"Then I felt for the bullet with a probe. Hearing it click against the lead, I inserted a spoonlike forceps in the opening, and by loosening the clamps, drew the bullet out through the opening. I then readjusted the clips, cleansed the wound, and left the patient. I did not expect him to live, nor did any of my associates.

"The next morning I went through the ward, and when I got to the man, he was asking to be allowed to sit up in bed. He later completely recovered and was apparently a perfectly well and strong man when I last saw him. I would consider him a complete recovery."

MINIATURE EIFFEL TOWER MADE WITH SCROLL SAW

A PIECE of scrollwork evidencing unusual skill and the expenditure of enormous time and patience is the miniature Eiffel tower shown herewith, which serves as a case for a clock. It stands 42 in. high and has a 22-in. base. No less than 82 pieces of wood, from which 8,500 parts have been sawed, compose the tower. Its construction occupied an average of five hours a day for 13 months.

Captain Pillinger also told of making an opening in a man's chest and lifting out the lungs so that part of them could be cut away. This grew to be a comparatively simple operation, he said, although, of course, great care had to be taken to see that the lungs were perfectly air-tight at its completion. He believes that this operation offers a cure for tuberculosis, at least in its earlier stages. The infected part of the lung may be cut away or otherwise treated. Whether it can also be used as a means of treating the lungs with sunlight or certain light rays, remains to be seen.

Both of these operations are outgrowths of the war and were almost unheard of before.

The use of the magnet as a means of removing bits of shell from the brain, prevalent in the earlier part of the war, was later discarded. It developed, Captain Pillinger stated, that the magnet drew the bit of shell directly to it, often destroying perfectly good brain cells. Only when the bit of shell had penetrated the brain in a perfectly straight course, could the magnet be used with safety.

"We gave up the magnet, however, and probed for the bit of shell with our fingers or some instrument. When we got hold of it, we pulled it out. The torn or injured brain cells were then cut out and the parts treated with a saline solution. Sometimes the patient would lie for days, apparently seeing nothing and hearing nothing. Then you would go in to him one morning and he would speak to you. Yes, some of the brain cells were destroyed, and the patient sometimes lost the sight of one or both eyes. Yet, some of the cells later would be replaced by nature.

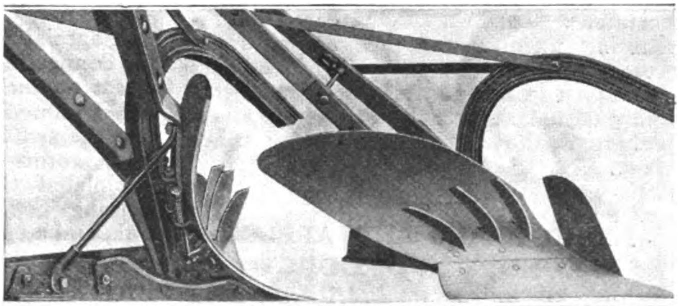
"I was with the British, the French, and the American armies for 18 months. During that time the old theories of cleanliness and germs were all but annihilated. Of course, it is better to have thoroughly cleansed and antiseptic materials with which to work. But I have used the same water in as many as six or eight operations, filtering it or otherwise treating it after each one. I have operated with the dust so thick that you could hardly see. I have had patients recover whose wounds had been infected in the worst kind of way for days.

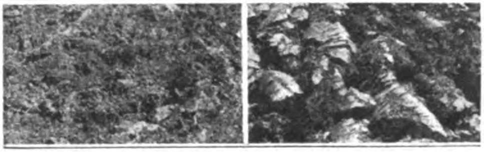
"And before I was ordered home I was beginning to wonder how a man could commit suicide. I have seen men wounded in all kinds of places with all kinds of weapons. I had a British sergeant walk into my operating station. He had a bullet through his head. It had gone entirely through the brain. Yet he recovered.

"When the surgeons could get hold of the men immediately after they were wounded, the chances for recovery were much better. There was one boy, a British lad, who had both arms and both legs blown off. He was loading shells in an airplane and dropped one of them. The bits of shell flew outward instead of upward. He was stooping over, and they took his arms and legs off. He was brought in at once. We stopped the flow of blood. Later I asked him if he wanted to live. He said: 'Yes, doctor, life is sweet, even like this.'"

PULVERIZING ATTACHMENT FOR PLOWS

An attachment for a plow has recently been invented which breaks up the soil as it is turned back in making a furrow. The extra power required to pull the plow so equipped is said to be surprisingly small, and the necessity of going over the ground with a pulverizer is entirely done away with. The new feature consists of three curved knives projecting through slots in the moldboard of the plow at such an angle that they slice the soil as it is turned back. The knives are pivoted to suitable supports on the back side of the moldboard, and are held in the proper position by means of coil springs, so connected to them that pressure against the cutting edges puts the springs under compression. This arrangement gives the knives enough play to prevent their being clogged with roots and stones. To all appearances the invention is one that may prove to be of material aid to the agriculturist, who always is in need of new devices that will save time and labor.





Above: Side and Rear Views of Plow Equipped with Knives, Which Pulverize the Soil as It is Turned Up, as Shown in the Picture at the Right

WAR-TIME AUXILIARY FIREMEN RENDER VALUABLE AID

Among the organizations which have rendered valuable service in the cause of public safety during the time that the nation's man power at home has been depleted, is the auxiliary corps of the New York fire department. These men responded to an urgent appeal for helpers to take the place of more than 500 firemen who were called to the colors. They were on duty from 8 p. m. until 6 a. m., sleeping in quarters provided by the department. Until they volunteered the remaining members of the regular force were sorely overworked. These helpers responded to second and third fire alarms and assisted at fires by stretching lines, picking up hose, and doing much other work.

AUXILIARY CORPS F.D.N.Y.

Members of Auxiliary Corps of the New York Fire Department, in Their Fire-Fighting Outfits: These Men Are Volunteers Who were on Duty Nights Doing the Work of Firemen Who were Called to the Colors

DRIED BEANS AND APPLES LAUNDRY BY-PRODUCT

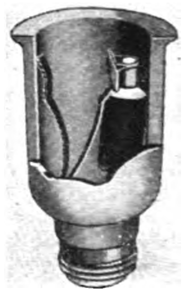
Vegetables and fruits are as easily dried as clothing by the evaporative processes of the modern laundry. The produce, mostly corn, beans, and apples, is brought to the laundry already prepared and placed on large trays in the drier. Steam is kept up for a while in the evening, and the trays are removed in the morning. Each tray holds about 10 lb., and the drier can handle 150 lb. at a time.

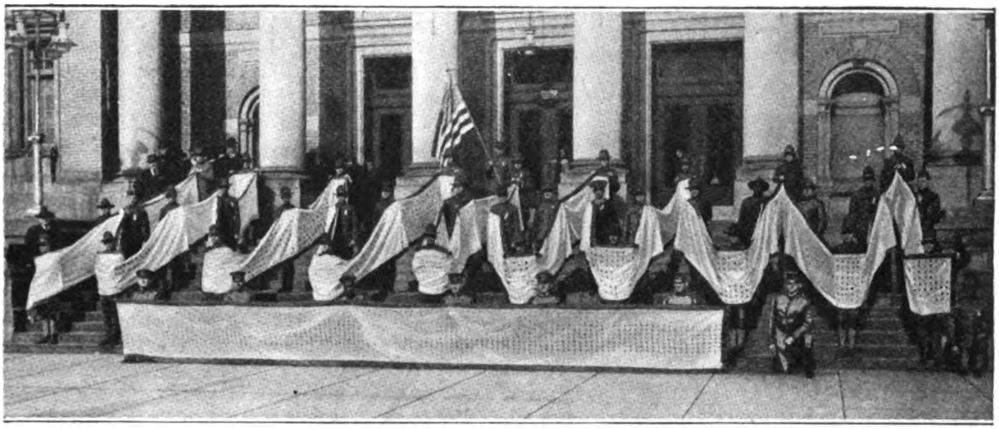
CARBON-BLACK PLANTS MOVE TO CONSERVE GAS

Because of the waste of natural gas in the production of carbon black, manufacturers of that commodity agreed to close their plants in the vicinity of Grantsville, W. Va., and hereafter to use gas wells in either Wyoming or Louisiana whose locations are too remote for community use. Carbon black is simply the soot deposited on metal plates in contact with an open gas flame. In the process the heat is all wasted, and but a small portion of the carbon recovered. Only 1⅛ to 1½ lb. of carbon black results from the burning of 1,000 cu. ft. of gas. The agreement was calculated to save 15,000,000 cu. ft. a day, which at once became available for domestic and public-utility use. A by-product of the gas, formerly wasted, is 5,000 gal. of gasoline a day, arrangements for the recovery of which were made. About 10 per cent of this country's population is in natural-gas territory.

PLUG PROTECTS MOTORS AGAINST OVERLOAD

A special feature of a switch designed for connecting alternating-current motors direct on the line is a protective plug located immediately below the switch proper. The motor circuit is completed through a heating coil, post, a link, and a spring contact arm. In case of an overload, the current will heat the post enough to melt the link, which is made of fusible alloy. This allows the contact arm to spring back, breaking the circuit. Because of the lag, the momentary inrush of starting current will not open the circuit unless there is a dangerous overvoltage on the line.





In This Service Flag There Are 31,200 Stars, of Which 1,002 Are Gold. It Is Ohio's Largest Service Flag and Represents the Boys from the Cincinnati Area of the Methodist Church

BIGGEST OHIO SERVICE FLAG FOR METHODIST BOYS

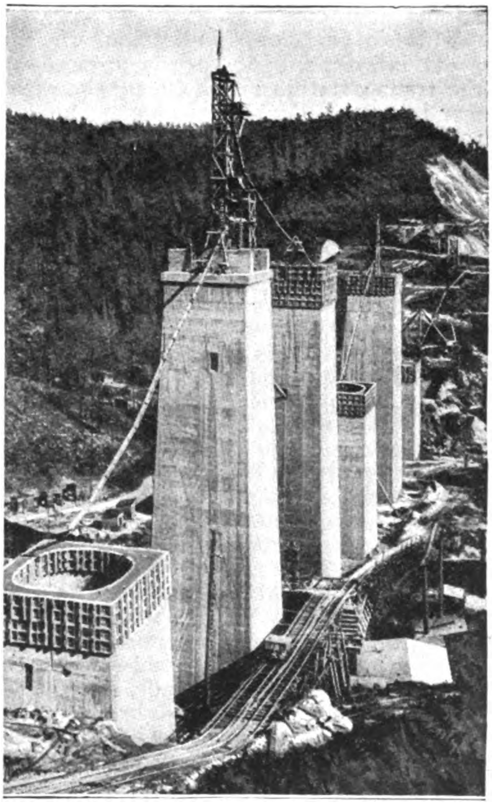
A service flag carrying 31,200 stars, unfurled in Memorial Hall, Columbus, Ohio, represents the boys from the Cincinnati area of the Methodist Church who went into service. Those who will not return are accounted for by gold stars to the number of 1,002. The flag, one yard wide, is 200 yd. long, and took the work of 320 women to make. It was carried to the hall by 50 Columbus soldiers and chaplains, and is the largest service flag ever displayed in Ohio.

WIRELESS SERVICE FOR MAIL AND PASSENGER PLANES

A radio company is now prepared to provide aeroplanes used in mail and passenger service with wireless outfits and operators in the same manner that it now supplies them to ships. Planes so equipped will each have a distinctive name, or number, so that it will be possible to send messages to persons in flight in the same way that communication is now maintained with vessels at sea.

CONCRETE PIERS FOR HIGH BRIDGE ARE HOLLOW

An unusual engineering feat in connection with double-tracking portions of the Southern Railway, is the construction of eight immense concrete piers to carry a 1,400-ft. bridge across a ravine near Toccoa, Ga. The structure is nearly 200 ft. high, and the piers are 30 by 34 ft. at the top. Because of their size, they have been made hollow, being the first piers of this type for a bridge of such height, it is said.



Hollow Piers for a Railway Bridge Nearly 200 Feet High, Not Far from Toccoa, Georgia: This is Said to be the First Time Construction of This Type has been Used for Piers of Such Height

NEW HIGHWAYS OF TODAY AND

By HARLAN

In Making Automobile Drives, "Rubber Stone" is Laid on Loose to a Thickness of Five Inches

ONE hundred and ten millions of dollars to be spent on permanent roads in five years—such is the allotment made by the states of Illinois and Pennsylvania in the recent elections, with similar sums likely to be voted soon by many of their sister states. Sixty millions was Illinois' share, to be paid entirely by automobile and motor-truck owners during the next 20 years without resorting to general taxation.

This is just one indication of the great interest in good roads aroused by the transportation needs during the great war just past. People are now awakening to the fact that the best investment they can make is in the construction of good roads, permanent roads, and roads wide enough to permit two automobiles or trucks to pass in safety.

Along with this tremendous increase in popularity of good roads has come the development of new and better types of pavement, each singularly adapted to the varying needs of heavy and light city and country traffic. There have come greatly improved methods of building our present types of road—the earth road, the tar or asphalt roads, the wood-block, stone, concrete, and brick roads, and with them, carefully compiled records of the costs. With this information, after making careful studies of the peculiarities of the locality, the water and material supplies, density of traffic, etc., the road engineer can prescribe the type and kind of pavement best suited to the present and future needs of any locality, as well as its probable cost.

The Country Road Commissioner Piles Soft Dirt and Sod on the Road and Drags It to a High Crown Almost Impossible to Travel in Wet Weather, and Bad in Dry

The earth road, most common of all, has been also the one most abused, for it seems to be the delight of most country-road commissioners to drag the dirt and sod from the side ditches up into the center of the road, thus building up a high crown that no ordinary vehicle could travel in wet weather without sliding into the ditches. These high crowns are being reduced, for it has been proved that an earth road with a slight crown can be kept in good condition at a much less cost. If the travel warrants the cost, light asphaltic oil may be applied occasionally as a dust preventive and surface binder, but people are coming more to a realization that this is but a temporary aid, and must be renewed often. They are therefore in many localities capitalizing this cost, and through the issue of bonds payable in from 15 to 30 years, they are obtaining the immediate use of hard roads at no additional cost.

In our cities and towns, where permanence, cleanliness, noiselessness, ease of making openings in the pavement, and the cost are the ruling factors, the pavement varies and the selection of the proper type is usually governed by the density of traffic. Here great strides have been taken. For residence streets, and others having a medium amount of traffic, there has been developed, at Detroit, Mich., a new type of pavement particularly adapted for the use of automobiles. It is called "rubber stone," and is a crushed limestone varying in size from ½ in. down to dust, impregnated with deliquescent or moisture-collecting and retaining chemicals. It is placed loose on the road to a thickness of 5 in., and rolled to a smooth, compact surface—elastic, dustless, noiseless, and weedless, and easy to take up and replace when it is necessary to get at pipes or wires beneath the pavement. When loose, it has the appearance of wet limestone

AND BYWAYS OF TOMORROW

H. EDWARDS

screenings, and when compacted, its smooth, damp surface takes up moisture from the rain, dew, air, and the soil beneath the road. Automobile tires, instead of acting as destructive mediums, sucking up the fine binding material for the wind to blow away, serve as constructive agents, packing down and ironing out the road surface. If a depression develops, it is only necessary to loosen the surface with a pick, throw in enough new material to provide a level surface, and tamp or roll it back into place. It is, in short, an excellent surfacing for medium traffic and residence streets, and for cemeteries, large estates, etc., where quietness and ease of maintenance as well as moderate cost are required.

For through streets, subjected to heavy traffic, the semimonolithic type of brick pavement has been evolved and will soon become the standard pavement for city use. It consists essentially of a 3 to 6-in. concrete base, or foundation, having placed upon it 1½ in. of a mixture of sand and cement, in proportion of one part of cement to from three to eight of sand. This mixture is cut to the proper crown with a curved template, and upon this surface the brick are laid and rolled, then flushed with water to provide moisture for the setting of the cement. The interstices, or joints, between the bricks are then filled with cement grout—a liquid mixture of about equal parts of sand and cement, providing a rigid, continuous, smooth, and lasting surface. The use of this sand-cement layer has been adopted to eliminate the many faults of the old sand cushion. This, during time of construction, often worked up between the brick and kept the cement filler from penetrating the full depth of the brick. The result is shown on page 564. Also, through vibration of traffic, moisture, etc., this layer of sand often compacted and shifted, causing the brick slab to rumble loudly as steel-tired vehicles traveled over it, and to break down in spots, producing loose brick, bumps, and finally ruts. The semimonolithic brick pavement is the natural evolution of the brick pavement for city use and will be adopted as standard by every progressive municipality.

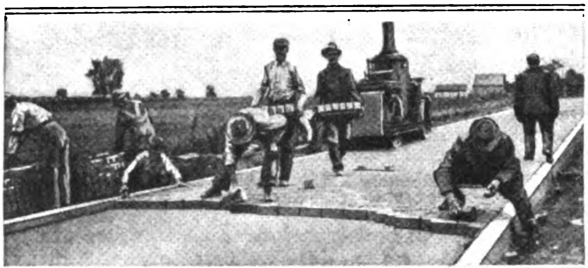
The Roughly Laid "Rubber Stone" is Struck Off to a Smooth, Regular Surface with a Wooden Template

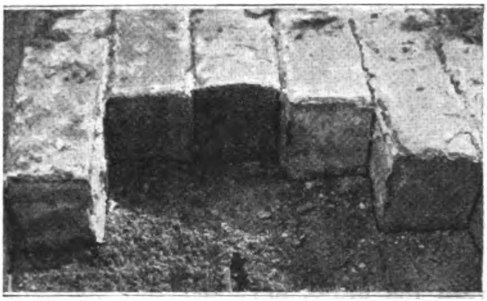
The granite-block pavement, used for years on streets subjected to heavy trucking, is also represented in the new methods of construction. In a number of eastern and middle-western cities, "durax," a type of the granite-block pavement new to most localities, is gaining favor, especially for use along and between car tracks and on heavy-traffic business streets. The method of construction does not differ essentially from that of the semimonolithic brick pavement, but the shape and manner of laying the stone blocks is entirely different from any other type. The durax block is a cube of granite approximately 3½ in. on a side. In laying, the blocks are placed in crescent-shaped rows, —the purpose being to make all the joints at an angle to the direction of traffic, to reduce vibration, noise, and wear to a minimum, and to lock the blocks so that they are not easily loosened or pulled out by traffic. The sheet asphalt, asphaltic-concrete, and creosoted-block pavements have retained their popularity in most cities for use on streets subjected to heavy traffic where noiselessness is essential.

In new construction for main and connecting roads outside the city, the types of pavement used have narrowed down to three—brick, concrete, and bituminous materials. The brick pavement, though in sharp competition with concrete, still maintains its supremacy among hard surfacings, for automobilists are beginning to complain of the strain on the eyes caused by the chalky whiteness of the concrete surface. The paving block, in former years of varying quality, is now subjected to severe tests, standard throughout the country, before being approved for use, thus assuring a uniformly tough wearing surface. The recent introduction of the monolithic type of brick pavement has caused a revolution in brick-road construction, and the old sand-cushion type has been relegated to the scrap pile.

The use of brick, or any other high-class pavement, however, is limited to localities sufficiently near centers of production so that freight rates do not exceed the advantage in wear and appearance of the pavement.

In the construction of the monolithic brick pavement a very interesting procedure is followed. The concrete foundation is laid to a depth of from 3 to 6 in. on the rolled-earth subgrade, and the surface is struck off with a steel or wooden template to the required crown. Immediately, before this has had time to become at all hard or set up, the brick are laid by hand and rolled to a smooth, regular surface by a hand or power roller. The interstices, or joints, between the bricks are then filled with cement grout, a mixture of approximately equal parts of cement and sand, wet to the consistency of ordinary paint. All these operations are carried on successively, so that the completed road will be a concrete slab with a brick wearing surface.


Laying a Semimonolithic Brick Surface on a Concrete Foundation—a Good Pavement When the Brick-Producing Center Is Near, Avoiding High Freight Charges


In the Old Sand-Cushion Pavement, Above, the Cement Grout did Not Always Penetrate the Full Depth of the Brick, and Many Faults Developed, among Others That Shown Below

Although this pavement is new, machinery has been developed almost overnight for its construction. A new power-driven steel template has been produced, which, using the side forms of the road as a track, cuts off the concrete base to the required crown and tamps it to a dense, solid consistency by means of several steel rockers, producing a thin film of mortar upon which to lay and grout the brick. By the use of this machine, the concrete base can be made with less water, so that a stronger pavement results. Several machines are now being developed to lay the brick upon this surface, and thus, by dispensing with four or six laborers now necessary to carry and lay the brick, the cost of the pavement can be cut down considerably.

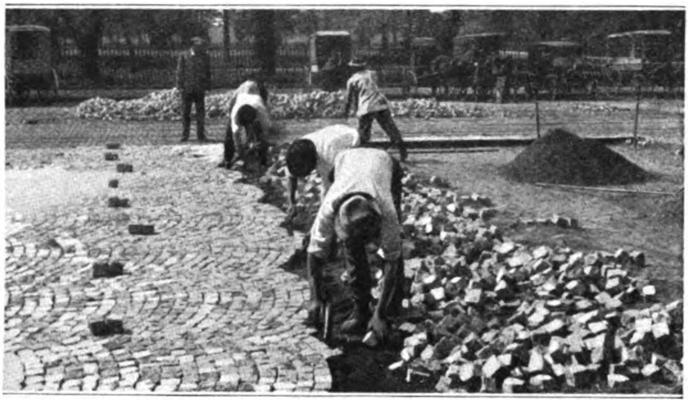
Here the Heat Expansion of Summer, Bearing Unequally on Protected and Unprotected Sides, has Shattered the Brick

This type of pavement has made possible the development of many new, money-saving ideas, so that old pavements can be made into new ones at a small cost. In a certain instance of this kind, a badly worn, rough brick road has been resurfaced with new, modern paving blocks at a cost of about $1.50 per square yard. The process was simple. After sweeping off the old pavement, a smoothing layer of concrete, made with fine roofing gravel, was placed on the rough brick and cut off by a wooden template to a smooth, even surface. New paving blocks were then laid, rolled, and grouted upon this surface, and a new, strong, and permanent road was the result.

In Champaign, Ill., the more economical idea of turning over and using the old brick has been quite successful. The old pavement was laid on a 2-in. sand cushion, with the joints between the brick filled with sand. The brick were taken up and the sand removed. Upon the old concrete base was laid the smoothing layer of fine gravel concrete, and the original brick, after being cleaned with wire brushes, were replaced, top side down, before the concrete had set. The brick were rolled and grouted in the usual way and allowed 15 days to set before opening the road to traffic. An excellent new surface was thus obtained at a cost of about 80 cents per square yard. There are many cities that could easily profit by these examples.

The cement road has been a favorite in

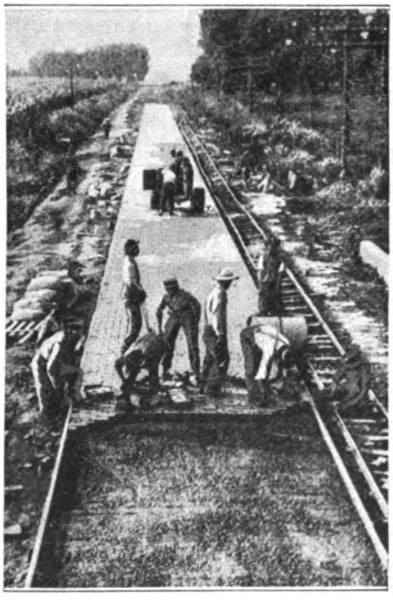
many localities on account of its simplicity and ease of construction as well as for its permanence. Many improvements have been made in its construction, all tending toward the production of denser, and, consequently, stronger and tougher concrete. At the same time the cost has been reduced somewhat by the elimination of the expansion joints, for it has been found by the Illinois State Highway Department that cracks in the concrete could not be entirely prevented by expansion joints; that it was cheaper and better to leave them out, let the cracks come where they would, and then to fill these with tar. Many schemes have been introduced for finishing the surface, the most useful recently adopted being the use of a light, wide roller on the fresh concrete, to squeeze out the excess water and compact the concrete, finishing up with a long, light canvas belt dragged back and forth across the surface. This produces a dense, even, smooth concrete, just rough enough to prevent slipping in wet weather.


Stone Paving with the Granite Blocks Laid in Curves Instead of Straight Lines Wears Much Longer Because Wheels and Hoofs Strike All Sides, and Corners and Edges are Not So Quickly Nicked Off

The bituminous-macadam roads are great favorites also in many parts of the country. Many of our more populous states have devoted much time and money to the construction of this type, especially for use where motor traffic is heavy. Adequate methods of maintenance are required, however; or it becomes rutty, rough, and a menace to travel.

Together with the development of all these different kinds of roads has gone the introduction of methods of maintenance and repair. Formerly it was the custom to build a high-priced road, then leave it without attempt to remedy slight imperfections until the surface had become practically ruined. The old adage, "A stitch in time saves nine," is nowhere more true than in road maintenance; hence many states now have adopted or are adopting the patrol system of maintenance, whereby the roads

This Monolithic Brick Pavement Is in a Very Raw State, Materials for It having Just been Dumped


Here It is Nearly Finished. The Men in Front are Laying the Brick, and the Others are Filling the Spaces

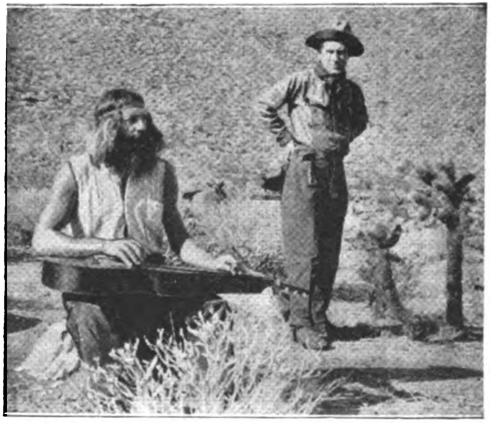
are kept in perfect condition by the continuous watchfulness of men trained in their repair.

With the adoption of these most efficient methods of construction and maintenance for all the roads soon to be built by the various states, and also for those built by the large Federal appropriation for interstate roads under the Federal Aid Act, our roads of tomorrow should be of maximum value to everyone. They will be built much wider and stronger than many we have now, and of the most durable materials, for they will have to bear a greatly increased motor-truck traffic if the growth in use of such trucks in the past few years is any criterion. They will reach out into every part of our land, uniting the country with the cities, making communication among all the people easy and convenient, inducing social intercourse, and thereby making of the whole population one great family.

The Equipment for Surfacing Work, as Seen Above, Is Simple and Produces at Small Cost a Smooth, Permanent Pavement Like That at the Right

MAKE NEW CAVE IN YOSEMITE FOR HERMIT'S HOME

About a hermit there always hovers an air of romance and mystery. Recognizing this feature as an attraction to the curious tourist, a wealthy hotel owner of Yosemite Valley prepared a commodious cave by blasting into the granite walls of the cañon, and set therein a transplanted hermit. The recluse in question had long been the sole inhabitant of a natural, but less pretentious, cavern in a hill of hardened lava in the Imperial Desert, near Palm Springs, Calif. Here his pet rattlesnakes, tarantulas, horned toads, and desert lizards, to say nothing of a steel guitar upon which he performed, had proved entertaining enough to draw auto tourists over 160 miles of road into the hot alkali sands. The transplanted hermit is now much more accessible.

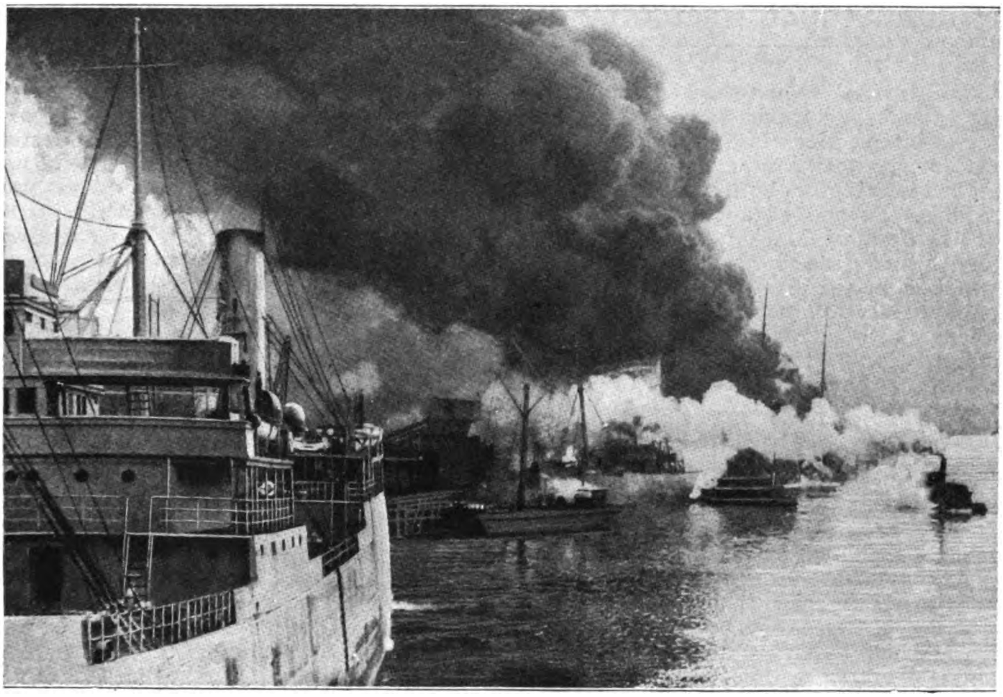


This Hermit of the Imperial Desert, with His Steel Guitar and His Reptilian Pets, has been Transplanted to a Brand-New Cave in the Yosemite

AEROPLANES TO CARRY RADIO OUTFITS TO INLAND CHINA

Typical of the manner in which modern inventions are bringing widely separated sections of the world in closer touch with one another is the fact that wireless stations are to be erected in remote parts of China. One of these is to be near the Kashmir border and another near the Siberian boundary. Equally interesting is the announcement that the apparatus for these stations is to be carried to its destinations in one or more large aeroplanes which expect to make the journey in two or three days instead of the same number of months.

¶By presenting its annual report by means of moving pictures, the directors of the Louisville Industrial Foundation have set a precedent that is unique in the annals of the business world. They considered it the best way of bringing visible evidence of their progress before their stockholders' eyes.



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Two Oil Steamers and a Barge were Destroyed in the Schuylkill River, near Philadelphia, When a Burning Tanker Spread Its Blaze over the Water

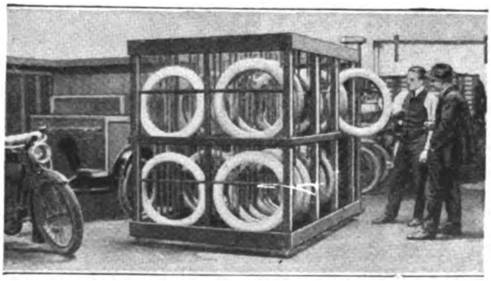
BURNING OIL-TANK STEAMER SETS RIVER ABLAZE

A river of blazing oil; the dull, booming reverberations of exploding iron oil barrels; jets of fire spouting from ignited pipe lines, and over all, the rolling black clouds that obscured the hulls of sinking ships—these were the spectacular features of a fire that destroyed two tank steamers and a barge at Point Breeze, south of Philadelphia. The fire started in the hold of an oil tanker lying in the Schuylkill River. In a few minutes the ship was doomed, and the fire spread to the others. Flame-pursued. seamen leaped into the blazing river while flying oil and sections of hot iron forced the fire fighters back and threatened the big refining plant on shore. Only heroism of battle-field quality saved the adjacent ships and property.

¶ During the past winter men were detailed by the Fisheries Bureau to cut holes in the ice formed over sloughs and ponds along the upper Mississippi River to prevent the repetition of what occurred the previous winter, when thousands of fish caught in these landlocked waters are said to have died from lack of oxygen.

TIRE RACK ON CASTERS FOR SMALL DEALERS

Tires hung from the ceiling, out of reach of customers, are not conducive to sales. A Los Angeles motorcycle dealer who observed that fact, but whose wall space was inadequate for a fixed rack, built himself a rack on casters, which serves his purpose well. It carries a small but sufficient stock, within easy reach and examination of the customer, and is easily rolled to any part of the floor. That feature also solves the usually embarrassing problem of sweeping and cleaning under the tire rack.



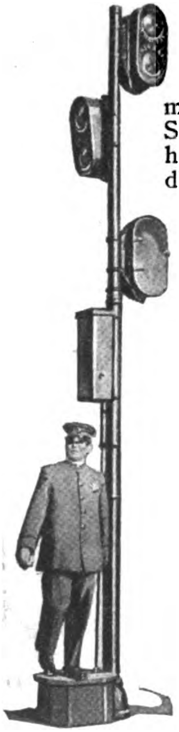
COPYRIGHT, JOHN EDWIN HOGG

This Tire Rack is Mounted on Casters, and So may be Put Anywhere in the Shop or Brought to a Customer

DUAL-SIGNAL MECHANISMS CONTROL TRAFFIC

To provide adequate means for controlling the heavy traffic existing at certain street intersections in San Francisco, special mechanical equipment has been installed which gives both visual and audible signals. Suspended above the pavement at the foot of Market Street is a large sign bearing the words "Stop" and "Go," which is made to revolve by a motor-driven apparatus contained in a small case above the sign. A traffic officer on the street operates the signal by means of a control switch, and when the motor turns the sign, it also causes a whistle to blow one or two blasts, according to the direction traffic is to travel. In case an ambulance or fire apparatus demands the right of way, the throwing of a special switch causes the sign to revolve and the whistle to blow continuously.

A somewhat different signal system, consisting of seven pairs of lights, red and green, is installed at the intersection of Market, Geary, and Kearney streets, and is operated by one officer by means of a foot lever. Here the direction in which traffic can move is indicated by red or green lights, supplemented by one or two blasts of a whistle operated automatically by motor-driven apparatus. Somewhat similar devices have proved helpful in handling traffic in other cities.



SUBSOIL MOISTURE IS CITED AS DROUGHT PROTECTION

Because of the long drought suffered in different parts of France last year, considerable interest was recently manifested in a report of scientific research read before the Academy of Sciences. Stress was placed upon the importance of the water present in the subsoil and the effectiveness of manure in preserving it. Use of the latter provides young plants with the moisture necessary for sturdy root development, which in turn defends them against seasonal droughts. It was disclosed that the normal quantity of water held in the soil to a depth of 1.64 ft. varies from 250 to about 390 tons per acre.

MODELS, TOYS, AND GAMES BOOST SHIPPING IDEA

Not battleships but merchant vessels are the approved mold for coming toys and the motif of new and exciting games for the youngsters. The project of encouraging youthful interest in the ship idea is so highly regarded that it has received official support and coöperation. Plans and blueprints used by the Emergency Fleet Corporation were gladly loaned to toymakers for study, and help extended in other ways. In games, merchant ships make competitive voyages and further encourage any latent seafaring tendency the coming generation may reveal, besides cultivating a map acquaintance with foreign ports.

The Signaling Apparatus at the Left, and That Shown in Use in the Other Picture, Illustrate Two Traffic-Regulating Devices in Successful Use at San Francisco Street Intersections

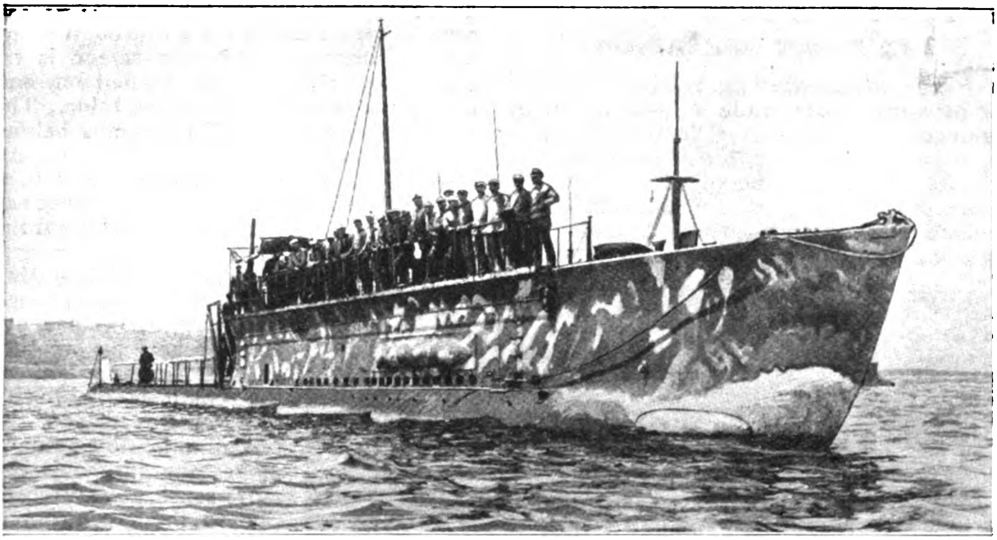


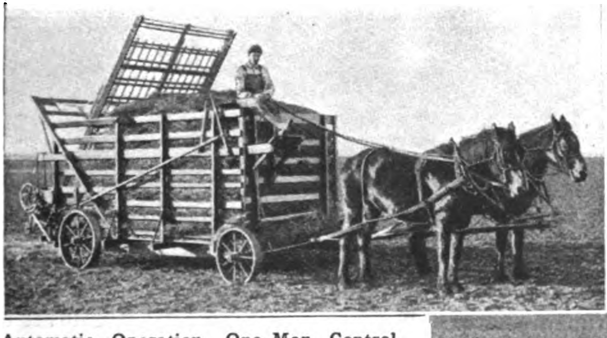
PHOTO BY CENTRAL NEWS PHOTO SERVICE

FRENCH UNDERSEA CRAFT OF STRANGE TYPE

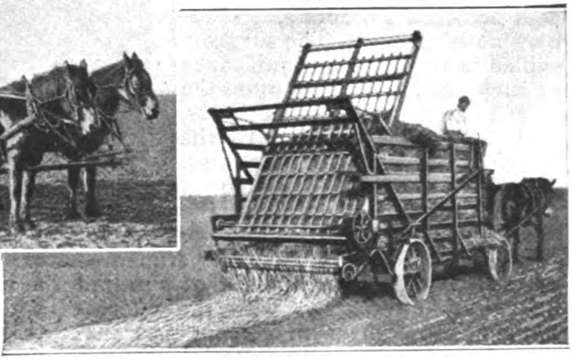
PRESENTED above is a photograph that shows a distinctively new type of submarine which is now in the service of the French navy. According to the information at hand, the vessel is considered the most powerful underwater craft so far evolved. It seems possible, however, in the absence of complete data, that the boat may be a submersible rather than a submarine—capable of sailing with deck awash, but not intended for deep diving. This suggestion, however, is mere conjecture.

FOUR-WHEEL STRAW SPREADER OPERATES AUTOMATICALLY

Of possible economic importance for certain agricultural districts is a one-man straw spreader of current development that is claimed to be the first successful four-wheeled apparatus of its type. It is built to handle a load of 1,600 or 2,000 lb. automatically, and is said to distribute an even layer of straw across a 9-ft. path. In general, the machine is much like a manure spreader, but it is intended only for the purpose of spreading straw. In operation, an endless-belt conveyor works on top of the load, raking the straw to a beater wheel. This is provided with guards that retain surplus straw and prevent uneven distribution. Underslung construction places the load low so that no material difficulty is encountered in using the machine in moderately windy weather. Likewise, the low center of gravity enables the spreader to be driven on side hills and uneven ground without danger of capsizing, even on a slope of considerable angle.



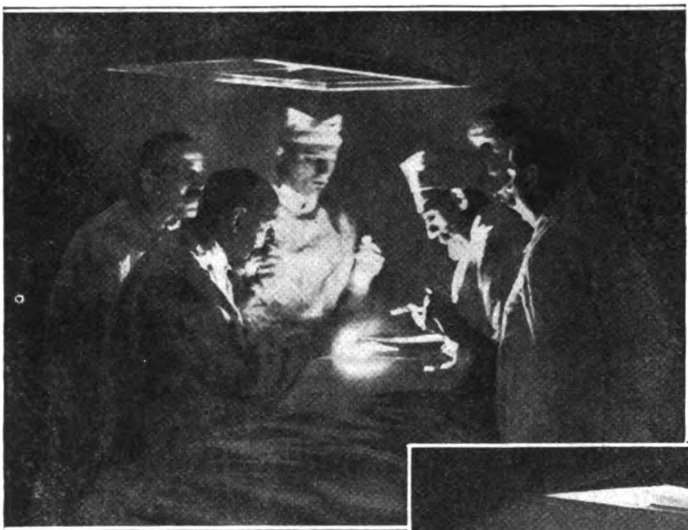
Automatic Operation, One-Man Control, and Full-Load Capacity Make the Apparatus Well Suited for the "Short-Handed" Farmer



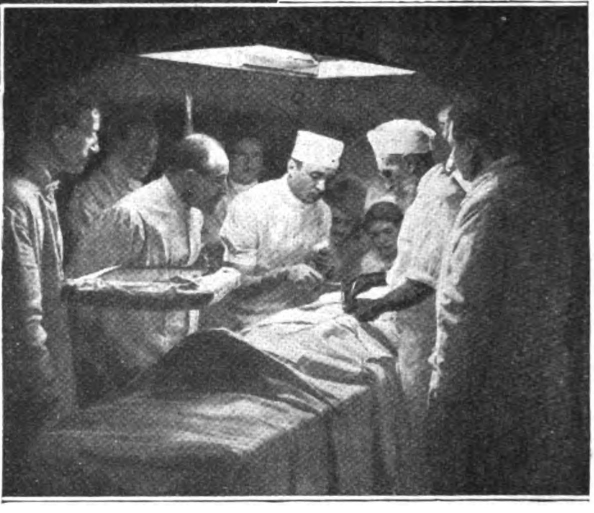
Showing the Machine in Use: Straw is Taken from the Top of the Load and Distributed Evenly across a Path Nine Feet Wide

RED LIGHT AIDS SURGEON IN X-RAY OPERATION

Silent, white-robed figures bending over a prostrate form while a lurid red light glances from sharp steel in their hands—it might be a stage setting for the Inferno, or the ultra-ingenious ceremony of some mystic league. But the red glare, which flashes and goes out and then gleams again in a deliberate cycle, marks a wholly beneficent performance. It is aiding the marvelous but limited revelations of the X-ray to guide the hand of the surgeon in its delicate repairs on damaged humanity.



All Lights Are Out While the Surgeons Examine the X-Ray Shadows on the Fluorescent Screen above the Patient's Body



Then the Red Lights in the Dome Overhead are Turned On, and Sharp Knives in Skillful Hands Work Out, in the Safety and Security of Adequate Illumination, the Knowledge Gained from the X-Rays in the Darkness

X-rays, penetrating human tissue, cast upon a luminous, fluorescent screen a silhouette, a shadow—nothing more. The surgeon, skilled in reading the significance of such shadows, gazes upon the screen and works in darkness, with his hands exposed to the baneful influences of the rays. The method did not satisfy a French surgeon. Conceiving the advantages to doctor and patient of adequate illumination, he experimented cautiously with a bright light of pure-red hue used alternately with the fluorescent screen. The arrangement was successful, and was put to splendid use in a French war hospital. With the X-ray tube below the operating table and the fluorescent screen above, an exposure of 30 seconds is found ample for a thorough study by the surgeon. Then the screen is removed and the red light turned on, emanating from a dome over the table. The dome carries twenty 25-cp. lamps behind a double thickness of pure ruby glass. An operation is quickly performed, and then the red light is turned off and another ray exposure taken, if necessary, to reveal the next step in the surgeon's work.

It is well known that the human eye, exposed to light of a primary color, reacts by creating an after-impression of the complementary color. For this reason, the red illumination actually makes the surgeon's eye more sensitive and receptive to the greenish-yellow rays from the fluoroscope. And similarly, the peculiar tint of the fluorescent light accommodates the eye to the red glow when the change is made.

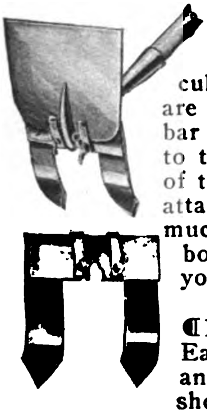
With this apparatus two brief X-ray exposures were necessary for removal of a piece of shrapnel in a soldier's heel, while a similar piece imbedded in the thigh required six flashes of the rays upon the fluoroscope, and six intervals of ruby illumination to guide the actual work of the knife.

CHANGE PROPOSED IN SYSTEM OF NAVAL CAMOUFLAGE

Toward the end of active warfare many methods of counteracting the optical effects of maritime camouflage became known to allied and, likely as not, to German naval authorities. Therefore one of the originators of the so-called "dazzle" system of protective painting is now active as its opponent and is advocating a return to a modification of the "great white fleet" idea. He would have all United States fighting ships painted white and gray, or white and pink. After conducting extensive experiments with models and small ships, he has found that a white boat with a light-gray superstructure possesses lower visibility than craft painted in any other manner. He also calls attention to the fact that under certain conditions a combination of white and pink blends with the background excellently and renders a ship invisible at a distance of about a mile. On the other hand, it is pointed out that a vessel of any color is highly visible when silhouetted against a brilliant horizon, or in the sunlight. Between these extremes, the white and gray boat is said to be of low visibility, and at a range of a mile or more is invisible.

CULTIVATOR ATTACHMENT FOR GARDEN HOE

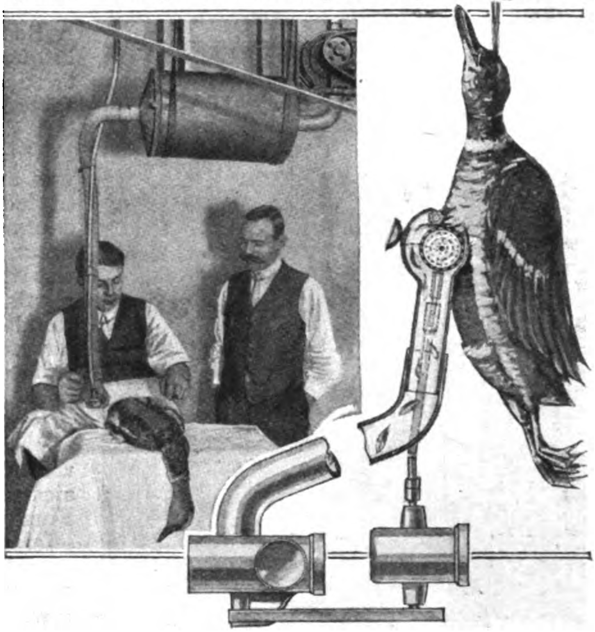
By clamping a two-tine attachment, recently devised, to the back of an ordinary hoe, the latter is equipped to serve as a hand cultivator. The two tines are mounted on a crossbar which is fastened to the hoe blade by means of thumbscrews. With the attachment one can save much time by cultivating both sides of a row of young plants at once.



¶Nine-o'clock curfew in East St. Louis, Ill., is announced on the movie-show screens just before the whistle blows, so that unaccompanied children can hurry home.

FOWLS QUICKLY PLUCKED WITH VACUUM MACHINE

A machine of the vacuum type has recently been developed for plucking fowls, with which, it is said, a person can remove all the feathers, dry, from an average-sized bird in about five minutes. A motor-driven fan creates suction in a large flexible tube, at the free end of which is a special plucking apparatus. This consists of a hood in which is a slotted roller, driven by a flexible cable and in contact with an idler roller of rubber. The rollers, as they revolve, pull the feathers from the flesh. Once loosed, the feathers pass through the tube into a large receptacle overhead.



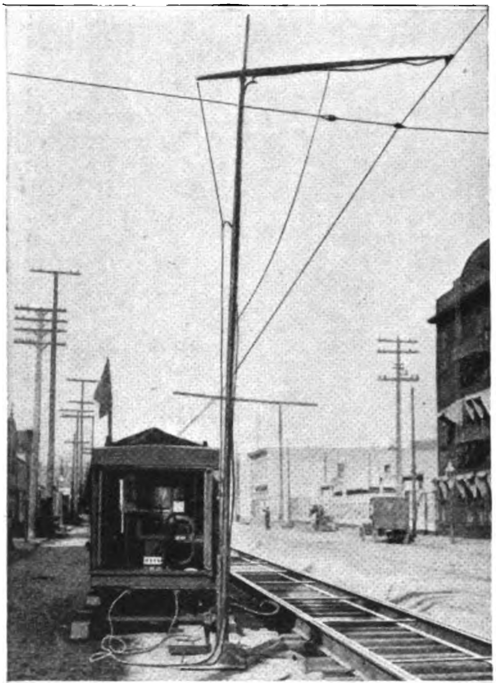
An Electrical Feather-Picking Machine: The Feathers are Plucked from the Flesh by being Drawn between Rollers Driven by a Flexible Shaft, and Then into the Receptacle Overhead

INDIA BUILDS WOODEN SHIPS FOR MERCHANT MARINE

India, fired by ambitions to have a merchant marine of her own, is reviving her ancient industry of shipbuilding. Steel, of course, cannot readily be obtained, but already 44 wooden vessels are being constructed of timber supplied by the forest departments in Madras, Bombay, and Bengal. To encourage the shipbuilders, moderate rates and easy terms are made on timber contracts, and the ship's insurance policy is security for payment.

TROLLEY-WIRE TAP PERMITS CAR TRAFFIC WHEN IN USE

Portable apparatus has been built for use on San Francisco street-car lines for tapping a trolley wire in such a way that it is not necessary to remove the device each time a car passes. The saving of time in operating machinery driven by the current obtained is considerable. The device consists of a broad-based steel standard intended to be set the proper distance from a track and having an arm at the top extending to the trolley wire. At the outer end of the arm is a contact plate which fits about the underside of the wire so closely that it does not interfere with the passing of a trolley wheel. Ropes are provided for adjusting the arm to the proper height. Current is carried by cable from the contact plate to the motor supplying power for the machinery in use.



Portable Trolley-Wire Tap Which Makes Contact in Such a Way That It does Not Interfere with the Passing of a Trolley Wheel

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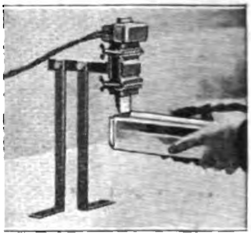
Once again, after an absence of 48 years, French pilots are to be seen on boats that ply up and down the Rhine. Recruited from the French navy, the men will guide steamers and barges carrying supplies to the army of occupation, and gunboats patrolling the river.

PIGEONS BEAR "S O S" CALLS OF AIRMEN ADRIFT AT SEA

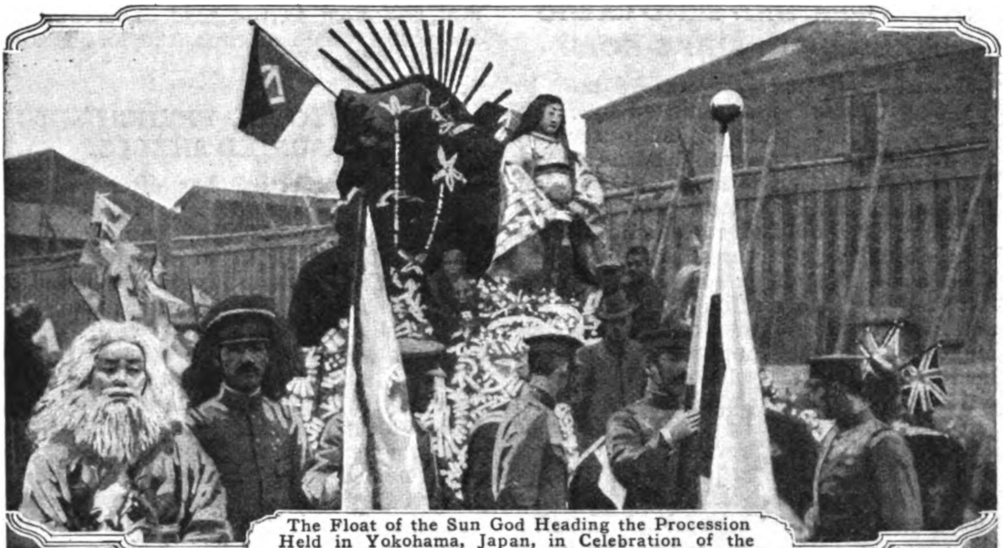
Much of the time the North Sea, because of its stormy disposition, is a most disagreeable alighting place for a seaplane. A Boston pilot, flying with two observers in quest of a German submarine, encountered engine trouble that necessitated a forced "landing" 35 miles north of Dunkirk during the period of active warfare. Fortunately for those aboard, the craft was not swamped by the waves when it settled to the surface, but there was no assurance that such a disaster might not occur at any moment after the sea anchor was thrown out. It was not possible to repair the motor, and even if the work could have been done, the condition of the sea would have prevented the machine from taking to the air. The only link between the seaplane and its base was a pair of homing pigeons. These, bearing messages, were released, one of them 30 minutes after the other. For three hours the airmen bobbed with the disabled machine. Finally a French trawler approached and offered assistance, which would have been accepted except for the sudden appearance of a British patrol which took the plane in tow. On the way back to Dunkirk, the boat that had been sent out in response to the pigeon-borne requests for help was met.

SOLDERING IRON FOR CANS HAS NOVEL FEATURES

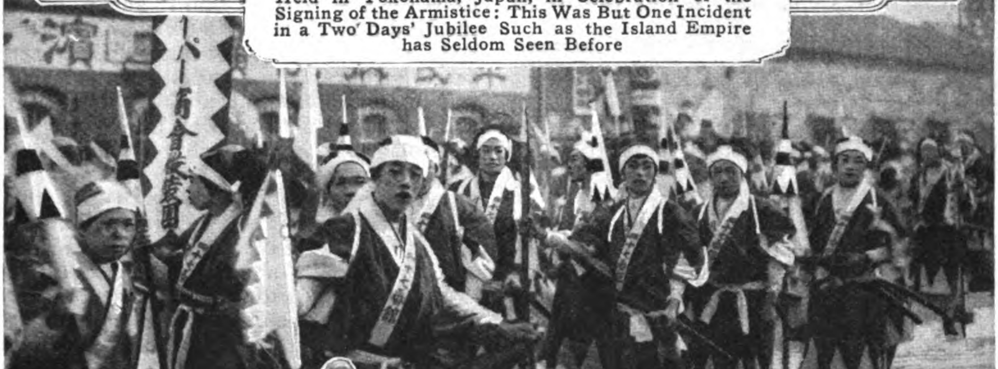


Some unusual features of a soldering iron now used in the manufacture of tin cans developed out of the difficulties of a biscuit maker, whose container department could not keep up with the government's demands for hardbread deliveries. A manufacturer of electrical equipment devised an iron made of a piece of bar copper, 1 to 1½ in. wide, and ⅜ to ½ in. thick, held between two iron plates and bracketed to the workbench. On the sides of the copper are clamped two standard electrical-heating units, insulated with mica and covered by a steel jacket. The heating units work independently and are easily renewed. Using this new tool, 150 operators each averaged 1,000 cans a day.

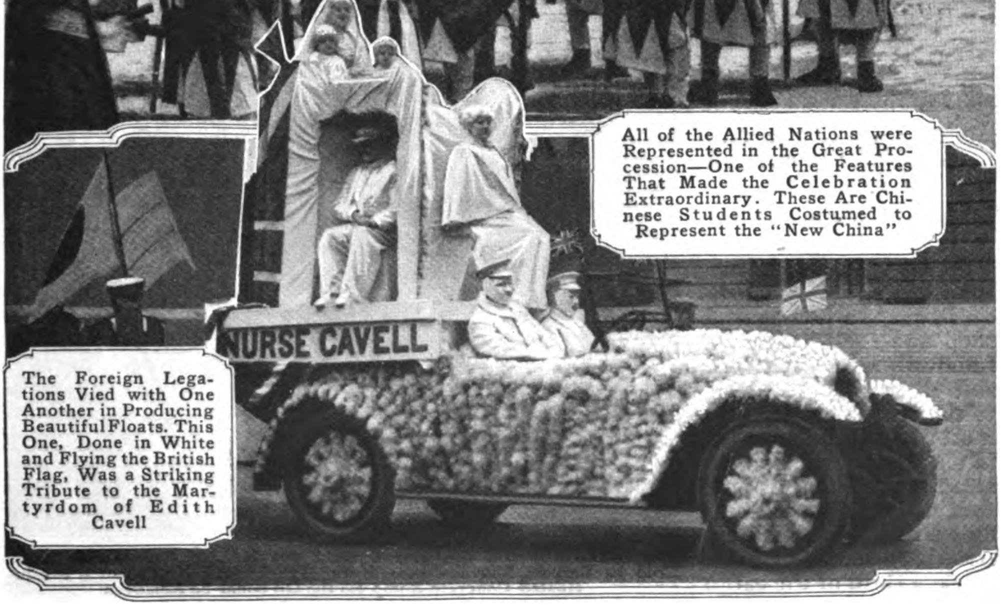
JAPAN'S PEACE JUBILEE A MARVELOUS SPECTACLE



The Float of the Sun God Heading the Procession Held in Yokohama, Japan, in Celebration of the Signing of the Armistice: This Was But One Incident in a Two Days' Jubilee Such as the Island Empire has Seldom Seen Before



All of the Allied Nations were Represented in the Great Procession—One of the Features That Made the Celebration Extraordinary. These Are Chinese Students Costumed to Represent the "New China"

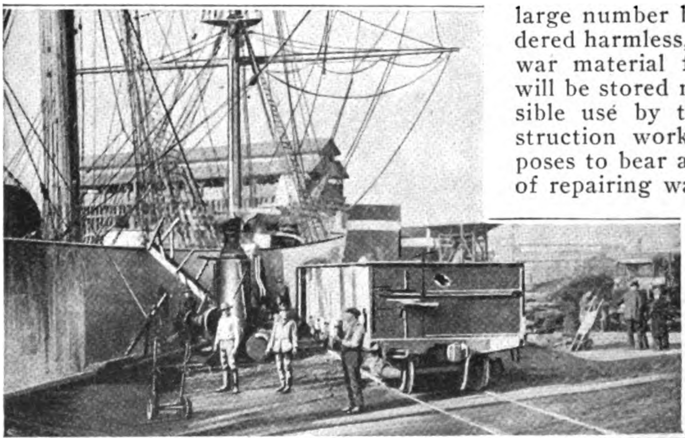


The Foreign Legations Vied with One Another in Producing Beautiful Floats. This One, Done in White and Flying the British Flag, Was a Striking Tribute to the Martyrdom of Edith Cavell

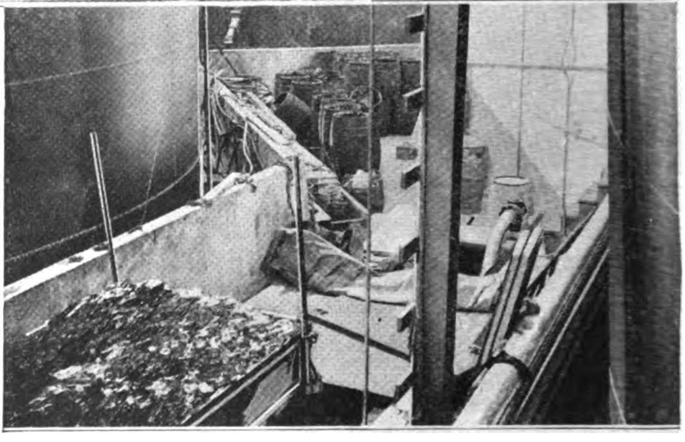
PHOTOS BY A. L. FLUDE

OIL, COPRA, AND SAND CARGO MIXED UP IN SHIP'S HOLD

A cargo, adequately described only by the word "mess," was removed by reluctant stevedores from a ship recently docked at San Francisco. The mess consisted of a random mixture of 7,600 bbl. of coconut oil, 2,500 tons of copra, and 500 tons of sand and rock ballast. The copra, or dried coconut meat, was spread loose upon the oil barrels to keep them from moving about in the hold. Some unanticipated process of oxidation, or fermentation, in the copra created enough heat to melt the semisolid oil, which leaked out of the barrels, soaked the copra, and ran down into the ballast. The ship came into port with four to seven feet of coconut oil in her bottom, a good portion of which was in the bilge, between the skin and the steel hull. The work of salvaging the cargo was characterized as the worst job in the history of the industry. It was necessary to pay stevedores time and a half to work on it, and the oil-soaked sand and rock had to be removed with pick and shovel, hoisted in barrels to the deck, shoveled into motor trucks, and carried to a concrete sump, with steam pipes along its bottom, to separate the unnatural composition. After two months of this work, a third of the cargo still remained in the hold. Disregarding the ship's waste of time, the loss is estimated at $250,000.



Hoisting Engines and Railway Cars Formed Only Part of the Equipment Used in Salvaging the Queer Cargo



The Mixture of Oil, Copra, and Sand was Hoisted Out of the Ship's Hold in Barrels, Shoveled into Motor Trucks, and Hauled to a Steam-Heated Concrete Sump So the Oil could be Removed

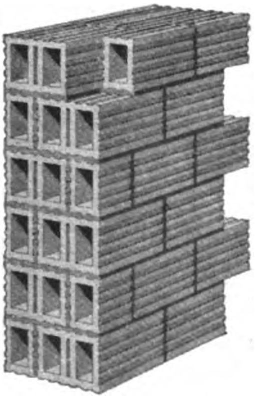
BRITISH TO RID FRENCH SOIL OF BURIED SHELLS

Popular conjecture has often pictured the plight of the farmer in northern France who should run the nose of his plow into the point of a buried shell, which, up to that moment, had failed to perform its function. That the danger is very real is demonstrated daily by explosions which, in some war-devastated districts, are almost constantly occurring. The high command of the British army, coöperating with the French authorities, is setting experts to the task of locating these buried menaces, which will then be removed or blocked up. At present cultivation of the soil is made dangerous by the presence not only of "dud" shells, but of the land mines and antitank charges laid in large number by both armies. Once rendered harmless, these and other abandoned war material found on the battle fields will be stored near railway points for possible use by the French people in construction work. The British army proposes to bear all the expense of this work of repairing war damage and making the soil of northern France once more fit for cultivation. Attempts to resume agricultural pursuits before the danger points were located and marked have already resulted in a number of casualties.

STORING SPRING FLOOD WATER FOR DRY-TIME IRRIGATION

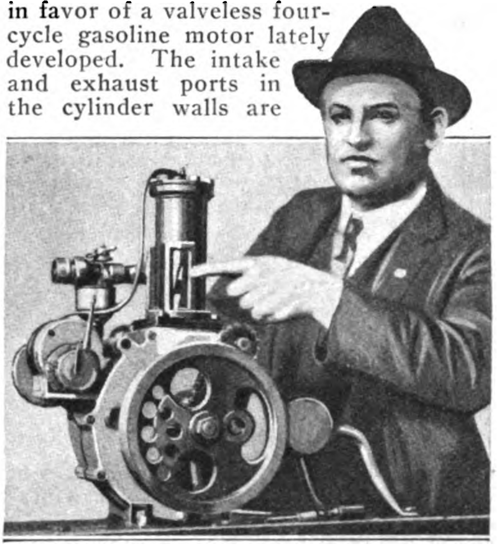
Inability of cleared and prairie land to retain any of the abundant flood water which passes over it during a brief period naturally suggests means of impounding such water for gradual and regulated use over the drought season. Construction of storage ponds with a team and scraper is comparatively inexpensive, costing in Texas from $200 to $300 for a tank of 200,000 to 300,000-cu.-ft. capacity. Such a pond, 200 ft. long, 100 ft. wide, and 10 ft. deep, will irrigate from three to five acres, half the water being lost by evaporation. The pond is located in the habitual path of flood water, and the hilly land terraced to prevent fertile soil from washing away. The earth retaining dam must be made with great care, with its foundation on solid subsoil, and a concrete spillway provided for excess flow. Often natural depressions can be utilized to save excavating. In parts of west and southwest Texas large windmills, operating deep wells, keep the ponds from going dry.

IMPROVED BUILDING TILE MAKES STRONG WALLS



Hollow tile, formed in single and double units, properly proportioned, can be laid to form a wall in which no two joints come together. Such an arrangement was sufficiently original to form the basis for patent rights, and tile is now manufactured to build walls whose thickness may be any multiple of 4 in., and in which all vertical webs are continuous from bottom to top. The partition that divides the double-size tile is itself hollow, making it correspond in all respects to a pair of single tiles laid side by side. The single tile is laid outside in one course, inside in the next course, and so on. Reinforcing bars may be run vertically through the wall without cutting the tile or breaking the interlocking bond. The size of the tile, 11½ in. long and 5½ in. high, corresponds to standard brick dimensions.

CUP-SHAPED PISTON IS USED IN NOVEL VALVELESS MOTOR



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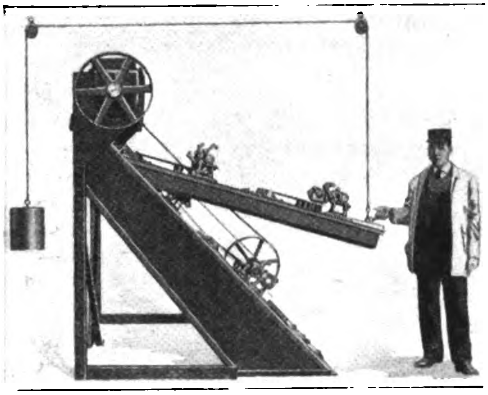
Working Model of the Valveless Motor: The Man Points to the Exhaust Port Which is Opened and Closed by Rotation of the Piston

Quietness, high efficiency, and simplicity are some of the advantages claimed in favor of a valveless four-cycle gasoline motor lately developed. The intake and exhaust ports in the cylinder walls are opened and closed by rotation of the piston. The revolving motion is imparted by a worm gear on the drive shaft through a keyway in the sides of a cylindrical sleeve, in which the piston operates. The latter is nearly twice as long as is customary, but is cup-shaped at the top so that the explosion head is inside, near the middle. Ports in the upper part of the piston register with those in the cylinder wall in the course of the revolutions. The claim for efficiency is based on the contention that better scavenging is obtained than with a motor using poppet valves, and that the cylinder is filled more satisfactorily on the intake stroke. Also, no power is lost through the lifting of valves and the compression of valve springs. Elimination of cams, valves, and push rods obviously is in the interest of quietness.

SEPARATOR SCREEN VIBRATED BY HARMONIC IMPULSES

Taut wires vibrate when periodical blows are struck upon a resonant surface near them. This is the principle used in vibrating the screens of a new inclined-type separator for rock products. Slow-speed, cam-operated hammers fall upon metal bridges, and the vibrations are transmitted to the screens without direct contact. The fine screen is protected by a coarse, or scalper, screen, and both are easily accessible. Because of the angle of inclination and the rapid and violent vibration, a comparatively coarse and sturdy screen yields a fine and uniform product without clogging the pores. When the cover, carrying the hammers and their mechanism, is lifted, the scalper screen slides out like the drawer of a cabinet, exposing the clear surface of the fine screen. Both screens are stretched by turning a few nuts. Unit construction permits a battery to be built up of two or more separators.



In This Material Separator the Screens are Vibrated by Hammers Striking on Tense Metal Bridges. The Hammer-Actuating Cams are Seen on the Lifted Cover

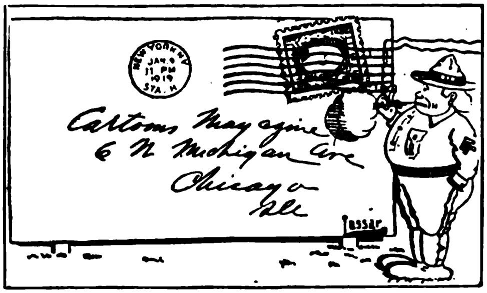
AUTOS RUN ON PLANK RAILS ACROSS ALKALI DESERT

Planks laid on the scorching alkali sand for 17 miles have made it possible to drive an automobile across the terrible Mammoth Wash in about 40 minutes. In the old days it was not unusual to spend the better part of a week on that short span of the Borderland Trail from Phoenix, Ariz., to the Imperial Valley, Calif. Many tourists took the Midland Trail, 250 miles out of their way, to avoid the nightmare of bottomless alkali dust and blistering desert heat. The plank path that dispels the terrors provides two 3 by 8-in. planks for each wheel track. They are nailed to stringers of the same dimensions, placed about 10 ft. apart. Frequent turnouts take care of passing cars, the rules of the desert giving the right of way to westbound traffic.

Laying Three by Eight-Inch Planks across 17 Miles of Alkali Desert to Enable Autoists Cross in a Jiffy This Formerly Almost Impassable Bad Land in Southern California

ENVELOPES FOR SOLDIERS ADORNED IN NOVEL WAY

Envelopes having cartoons of soldiers printed on their faces recently have become very popular with army men in certain camps. These imprints give the soldiers' mail a distinctive character which they like. The envelopes are suitable for use as souvenirs as well as containers. The cartoons are printed in red, green, purple, and other shades.



Envelopes Having Cartoons Printed on the Face are Becoming Popular with Soldiers for Souvenirs as Well as for Regular Correspondence

DEADLY PHOSGENE WAR GAS FINDS PEACEFUL TASK

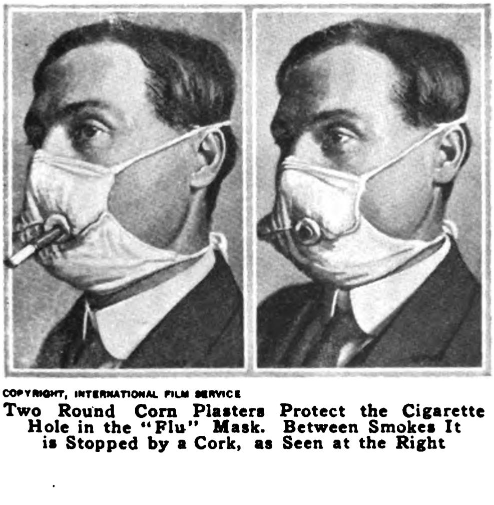
Phosgene gas, deadly compound of chlorine and carbon monoxide, has been offered an occupation for peace time. It has been found to serve as an effective bleach for sand. This action it accomplishes by destroying the iron oxide which is responsible for the reddish or brownish tints of the sand. Bleached sand is used in the manufacture of fine glass for optical and eyeglass lenses. There are no less than 121 varieties of such glass, all of which may now be readily produced in the United States, adding one more to the industries no longer dependent upon imported products.

WEEKLY REMINDER REPLACES POCKET NOTEBOOK

Pocket notebooks abound in all forms and varieties, many of them so substantially made that they long outlive their usefulness. A little eight-page vest-pocket size "reminder," issued as an advertising novelty, has the advantage that it is only intended to last a week, at the end of which a new one is substituted. In its 3 by 8-in. space it includes blanks for "Things to Do," names and addresses, telephone numbers, engagements, letters to write, memos, a "scribble sheet," two pages of cash accounts, a calendar for two years, an "emergency list" of things to attend to during the week, and as a finishing touch an 8-in. ruler graduated in eighths.

"FLU" MASK FAILS TO STOP INVENTIVE SMOKER

Compulsory wearing of "flu" masks, which became quite common during the recent influenza epidemic, put a temporary but effective stop to smoking on the street in the afflicted communities. An inventive machinist in San Francisco, however, got around the difficulty by cutting a small hole in his mask and pasting a round corn plaster on each side. The cigarette is inserted through this hole, which is corked when not in use.



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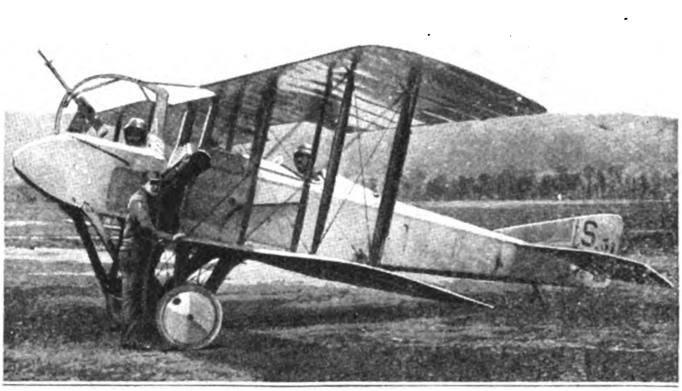
Two Round Corn Plasters Protect the Cigarette Hole in the "Flu" Mask. Between Smokes It is Stopped by a Cork, as Seen at the Right

TWO-SEATER "SPAD" HAS NOSE AHEAD OF PROPELLER.

In several respects the new two-seater "Spad" biplane of the French air service



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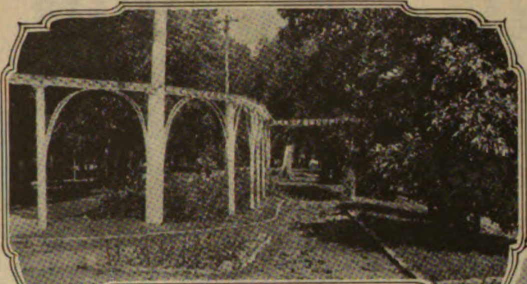
Side View of the Interesting "Spad" Two-Seater Biplane, with Propeller Dividing the Body in Two Sections: The Gunner's Cockpit is Supported by Struts Connected with the Landing Gear

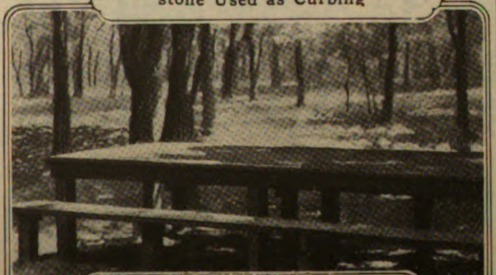
is strikingly individual in design. Its chief novelty lies in the body construction. The nose contains the gunner's cockpit and is separated from the fuselage proper by the propeller, which is set within the leading edge of the top plane. The center section of the latter, therefore, is cut away on the leading edge as well as on the trailing one. Division of the body by the screw is not a strictly new idea, for it was employed several years ago in the American-built Gallaudet seaplane. As found in the Spad, however, it is unusual. The nose section is supported by two struts connected with the landing chassis, and is also held by members that join the upper wings. Ailerons are provided on both planes.

AMERICAN ARMY HAS ON HAND MILLIONS OF CANDLES

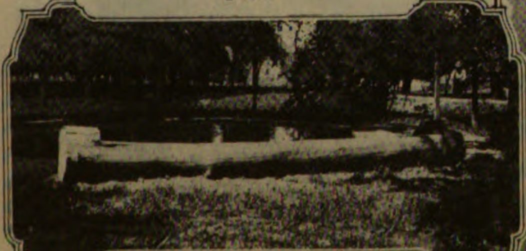
At the signing of the armistice the American Expeditionary Forces found they had in their possession 46,000,000 candles, made according to army specifications. Each candle will burn 10 hours. If burned one at a time continuously, it would require 52.511 years to use up all these candles. However, though they were intended primarily for trench use, probably the supply is sufficient only for immediate needs, it is said, in a statement authorized by the War Department. The candle still remains the simplest and most reliable of portable luminants.



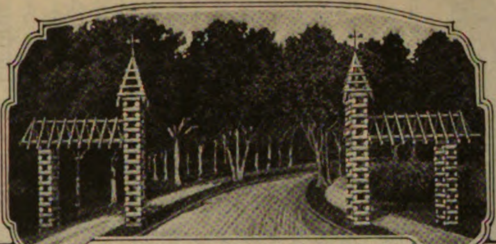
Simple and Effective Support for Vines: It Also Shows Cobblestone Used as Curbing



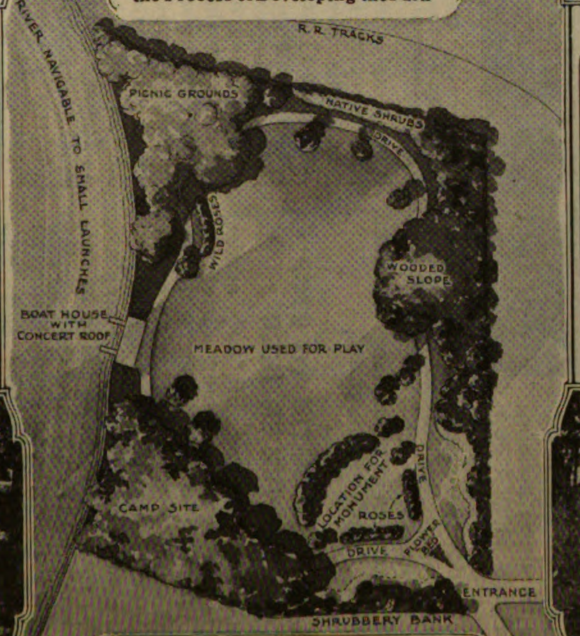
Tables and Benches for Picnickers should be Provided in Simple Form



Nothing Need be Wasted; a Hewn Log Makes a Good and Picturesque Bench



Rustic Entrance for a Small Park, to be Built of Timber Felled during the Process of Developing the Park



Typical Plan for a Park of 25 to 50 Acres, Suitable for the Recreational Use of 5,000 People

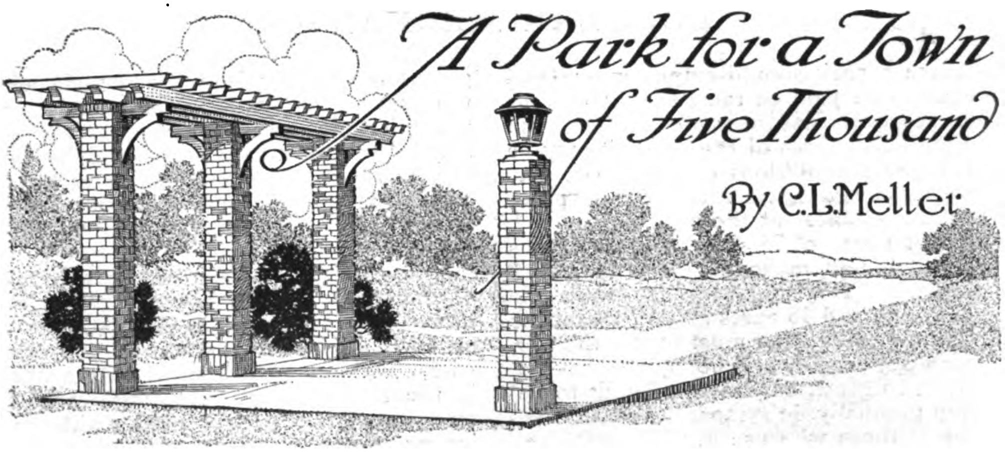
Here is Shown the Use of Evergreen to Bring Greater Variety into Foliage Bank

A Rustic Path, Bordered by Native Shrubbery and Defined by Two Bowlders

Simple and Effective Arrangement of Stone at End of a Culvert

A Park for a Town of Five Thousand

By C. L. Meller

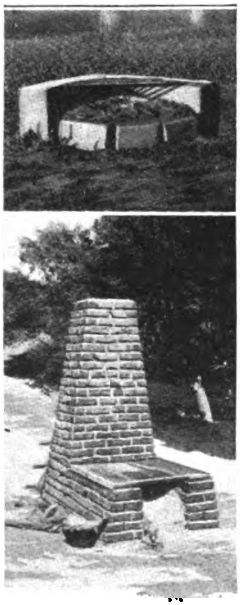


Brick Pillars, Elaborated into a Pergola at One Side and Carrying a Lantern at the Other, Form a Very Effective Entrance. Concrete may be Substituted for Brick, and a Parapet with Urns for the Pergola

IN the landscape architect's ideal conception of an acre of park for every hundred inhabitants, there is no guide for calculating park space appropriate to a town of 5,000. It is evident that an acre more or less would not be a determining factor in its value. The problem of relative size is really a local one, its answer depending on the community's facilities for outdoor enjoyment, on the benefits that will accrue to it by the acquisition of a park, and on the specific idea which lies behind the desire for a park.

The commemorative motive is peculiarly appropriate in park planning just now. Every town has its returning heroes, and perhaps some who return only as names on a dreaded list. That alone, while it has little to do with size, is a sufficient justification for all necessary expenditures, linking the park permanently with the warmest and strongest associations of the community. The motive may be perpetuated in a suitable memorial to be placed near the park entrance. An appropriation of $2,000 for this would not be too much.

Camping and picnicking, two legitimate park uses, both suggest an appeal to the motorist. A good camp site is preëminently adapted to the attraction of strangers, thereby bringing some added trade to the town merchants. For the campers good drainage is essential. Adequate sanitary provision calls for two wooden outhouses, costing perhaps $20 apiece. Water supply is necessary, an extension of the city system unless a natural spring—always preferable from the camper's standpoint—be fortunately available. While the present amount of automobile traffic will help in estimating the camping area, the attraction once established is likely to bring more traffic. A tentative allotment of five acres will allow later development. A picnic ground has greater appeal to the local population, though it, too, will draw pleasure seekers from neighbor communities. Grass and shade are the main requirements, to which should be added tables and benches arranged to accommodate several groups without interference. Fireplaces of simple design are inviting and useful. Another five acres may be set aside for the picnickers.



Top View: A Fireplace Simply Constructed of Concrete Blocks from an Old Foundation Held Together by Concrete. Iron for Such a Fireplace may be Procured at a Junk Dealer's. Lower View: A More Elaborate Fireplace with a Chimney, Built of Brick

Provision must be made for play, both juvenile and adult. A few seesaws among the trees, rope swings hung from the branches, baby swings, and a generous sandpile—at least a carload—take care of the children. A level, even area, large enough for at least one or, better, two baseball fields, can also be used for football and other games as the season changes. Ten acres is ample, four acres the minimum, for this purpose. If natural skating surface does not offer, some means of flooding the field in winter might be studied out. A flagpole may be installed at one side of the field.

Since a park should emphasize natural beauty, one part of the site will best be left nearly as nature made it. This will be the elastic unit of the park; it may be as large as conditions allow, and it may be encroached upon for other purposes as the usefulness of the park grows.

A total area of 25 acres, apportioned as indicated, will make a very satisfactory park. We may regard 50 acres as the maximum, and 15 acres as the irreducible minimum. The plan must follow the site, laying out broadly and boldly the way the park is to grow, but leaving details to develop gradually, in sympathy with the desires of those who use it.

The approach proclaims the park. Therefore a fitting entrance is the first important consideration. If the park is near the business section of the town, extending the approach to the main street, by means of a parking strip planted to trees, is very effective. Such a strip, extending for one block along the middle of the street from the park entrance, with pillars of suitable design at the end, will cost not less than $500. Formal park-entrance pillars of brick or stone may be elaborated to a vine-draped pergola on each side, costing complete at least $350. Or a rustic entrance, to harmonize with a wooded area, may be constructed of timber from the clearing of the site. Only sound logs and limbs of durable wood should be used. For such an entrance of appropriate size, 200 hours of labor must be allowed.

The Japanese Type of Swing Seen at the Left has Proved Very Popular with the Children, and is Easily Made from the Timber Felled in Clearing the Park

Well-Located Stumps Need Not be Pulled; Frequently, with a Little Ingenuity, They can be Made into Comfortable and Attractive Seats Like the One Above

A flower bed curbed with field stone, so placed as to divide incoming and outgoing traffic, will need at least a thousand geraniums to be effectively in scale with the rest of the park. Maintenance expense for this will run $100 a year, which may be reduced to about $30 by substituting such annuals as petunias or verbenas. Edging plants will add a few more dollars, and planting may be figured at 40 hours.

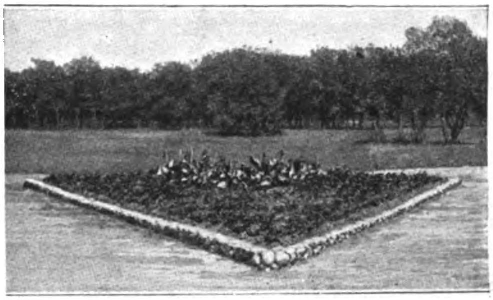
A driveway should skirt the greater area of the park a fair distance from the boundaries, returning to the entrance in an easy and natural manner. A dirt road, whose maintenance requires only a drag, is usually sufficient. Holding traffic to one direction will save road width, and inconvenience nobody; and it may be closed in wet weather to reduce upkeep. The road's course should take advantage of all natural views and objects of interest. After the driveway is roughed out (not forgetting an automobile-parking area) it will be developed by the labor employed in park maintenance, and so has no definite cost figure.

Felled timber will be useful for benches of various design, for rustic railings and bridges, for seesaw horses and swing uprights. Properly located stumps are easily made into seats. The cost of a seesaw is about $7, while baby swings call for an investment of at least $20. Tables and benches should be strongly built, and anchored to the ground. Varying with the locality, the cost will hardly be less than $8 for a table and two benches. Rocks have their uses, in moderation, as retaining banks for terraces, markers for path terminals or intersections, or to define the drive where the land slopes toward it. A pile of stones at the ends of a culvert helps retain the soil. Fireplaces for the picnickers will cost from $3 to $5, for a simple concrete hearth, and $15 or more, for a brick structure with a chimney. Use of field stone or other waste material eliminates a specific cost figure. Make the fireplaces of ample size, comfortably high, and with a fire pit not more than 10 in. deep. From the picnic ground the play field should be especially accessible. Heavy stumpage can best be blasted out, and a good grade obtained by plowing, disking, scraping, dragging, and rolling.

Formal planting should be restricted to a small area near the entrance. Masses of flowering annuals to begin with, worked over gradually to herbaceous perennials, such as peonies, phlox, and delphinium, outlined in free curves against a background of shrubbery, can scarcely fail to produce a pleasing effect. Vine supports work into such a picture nicely. Such sturdy, self-reliant perennials as iris, peonies, etc., in large masses, will stand setting apart from their background. Planting for the rest of the park should not be elaborate, and the use of natural material is best. Clumps of shrubbery, at the edge of timber and in places along the drive, will attract a variety of birds. Ferns can gradually be established in the woodland, the wild native bloom being studied as to its requirements for shade or sun. Interesting plants and vines can be found for steep and rocky hillsides. Few paths should be prepared, and those narrow and inconspicuous.

Land prices are a local problem, but other charges are roughly standard. A typical 25-acre park, designed as described here, has cost, for development and maintenance in the last seven years, a total of $10,270, or $1,500 a year. The hand labor for the seven-year period cost $2,500, at 20 and 25 cents an hour. Team labor cost $1,050 at 50 and 70 cents an hour. Policing cost $6,720, at $80 a month, which included all caretaking. The man selected for this post must be tactful, industrious, a fair craftsman, and have a high degree of interest and pride in the park. These, of course, are pre-war figures.

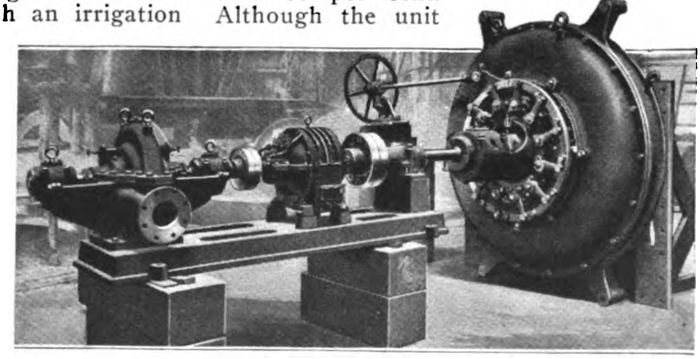
We have not discussed the subject of buildings. The purpose of a park building varies with the climate, the location and natural advantages of the park, and could scarcely be built to keep harmony with the rest of the plan for less than $3,000. If one is contemplated, it should contain toilet facilities and be heated in winter. A place for music may be included, and perhaps a stand for refreshments, etc. The latter problem is well solved by making the stand a concession, returning a small profit.


A Formal Flower Bed near the Park Entrance, Curbed with Stone, Serves as a Divider for Incoming and Outgoing Traffic

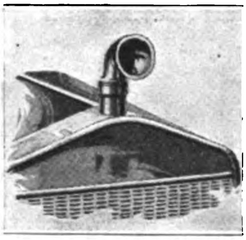
Allowing for variations from the figures named, an annual expense of not to exceed $2,000 will provide a town of 5,000 with a park that will adequately serve all the needs of the people and be a perpetual credit to the community.

INTERESTING WORK IS DONE BY HYDRAULIC UNIT

Quite a novel pumping unit is employed in connection with an irrigation project in the state of Washington. Its application at first thought seems somewhat like lifting oneself by the bootstraps. The installation consists of a hydraulic turbine directly connected through speed-increasing gears, to a centrifugal pump. The water wheel operates under a 20-ft. head, and at 350 revolutions produces 35 hp. The pump, on the other hand, working at 1,450 revolutions, elevates about 800 gal. of water a minute against a head of 115 ft. It is the speed of the pump, of course, that compensates for the great inequality in the relative heads. The efficiency of the unit is somewhat greater than 50 per cent. Although the unit itself can hardly be called unusual in character, the work it does is at least sufficiently novel to be interesting.

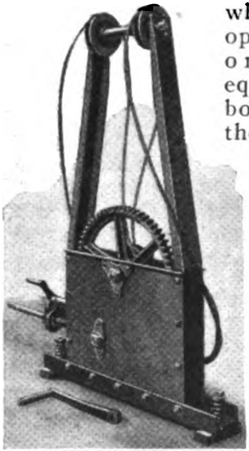

The Turbine, Operated under a 20-Foot Head, Drives, through Speed-Increasing Gears, the Pump Which Elevates Water against a 115-Foot Head

DIMINUTIVE SHIP'S FUNNEL AIR INTAKE FOR RADIATOR



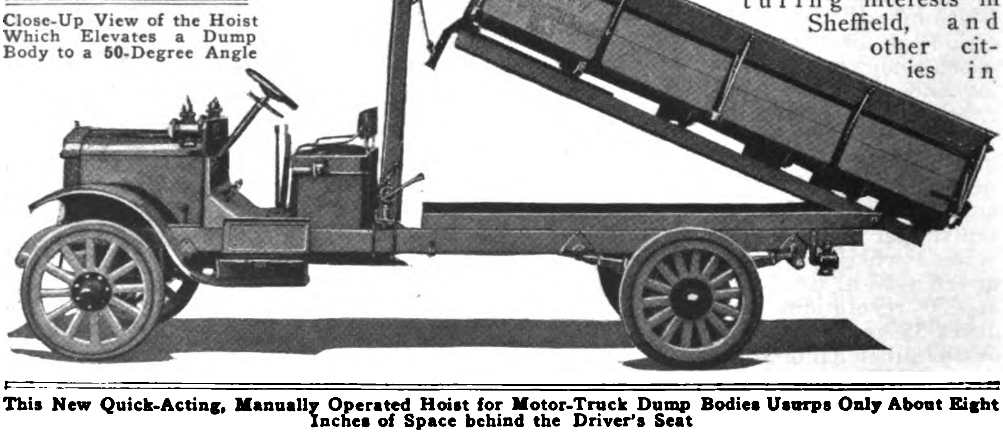
To aid the cooling system of an automobile, an air-intake spout, designed in miniature to resemble a ship's funnel, has been evolved as a radiator cap. It aims to assist in forestalling overheating by allowing an inrush of cool air to reach the inside of the radiator. A screen is provided in the funnel opening for the purpose of excluding dust and other foreign particles.

HAND-OPERATED TRUCK HOIST WORKS WITH GOOD SPEED



Close-Up View of the Hoist Which Elevates a Dump Body to a 50-Degree Angle

There are a number of serviceable features incorporated in a new hand hoist which has been developed for installation on motor trucks equipped with dump bodies. Chief among them, perhaps, is the speed with which the device performs its function. It enables a single operator to elevate a loaded dump body to an angle of about 50° in less than two minutes. The mechanism is compactly housed and occupies only about eight inches of space behind the driver's seat. Furthermore, it is but five feet in height, which allows the truck on which it is installed to pass through an ordinary shed or garage doorway. Power is applied through a double set of gears, and transmitted to a drum about which steel hoist ropes are wound. A five-ton load, it is said, can easily be raised by one man at the crank.



This New Quick-Acting, Manually Operated Hoist for Motor-Truck Dump Bodies Usurps Only About Eight Inches of Space behind the Driver's Seat

OPTICAL ILLUSION IS MENACE TO OPEN-WATER BATHERS

Attention has been called to an optical illusion that may be responsible for the drowning of many bathers. When swimming with a strong wind, one moves more slowly than the waves and consequently often suffers the mistaken impression that he is being carried backward by an offshore current or "undertow." Panic frequently seizes the swimmer, especially if he is inexperienced in open water, causing him to increase his effort and quickly exhaust himself, with fatal result. Obviously, therefore, it is always well to estimate progress by sighting a fixed object ashore. Watching the waves go past one is analogous, in the sensation it produces, to watching a forward-moving train from a window in a stationary car alongside. All of which recalls that coolness of mind is always a prerequisite of safety.

SHEFFIELD, ENGLAND, SEEKS IMPROVEMENT OF CANALS

Extensive waterway improvements in Yorkshire, England, are proposed, which, if carried out, will greatly benefit the large manufacturing interests in Sheffield, and other cities in

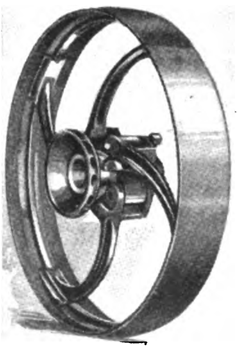
These Motorcyclists are Competing for the Honor of Riding the Smallest Possible Circle in a Pit of Soft Sand. The Winner has Just Taken a Header in His Nine and One-Fourth-Foot Circle

north-central England, enabling them to send shipments by small steamers to Humber River ports, and thence abroad. In order that the project of widening and deepening the system of canals forming the route may be carried out, it is urged that either the national government or the municipalities interested take the matter in charge. One of the regions which would derive important benefit would be the Doncaster district, 18 miles down the canal from Sheffield, where great coal fields have been opened up in recent years. Steel and iron manufacturers at Sheffield have not been able to use the existing canals extensively, owing to the loss of time involved.

MOTORCYCLISTS IN CONTEST RIDE CIRCLES IN SAND

Riding the smallest possible circle in the softest possible sand is an ingenious diversion that occurred to a party of motorcyclists visiting Exposition Park, Los Angeles, recently. The impromptu rules of the odd contest provided that the rider must neither fall off nor put a foot down to save himself from falling. The first rule was honored mostly in the breach, and all eight contestants flopped into the sand a number of times. The winner, after five headers, completed a circle with a diameter of 9 ft. 3 in. His nearest opponent made an even 10-ft. circle. The rear wheels of some of the motorcycles ground themselves into the sand until they had to be lifted out. This soft, fine, yielding surface not only tried the skill of the riders but tested the mettle of the motors.

SHOCK-ABSORBING PULLEY FOR CREAM SEPARATORS

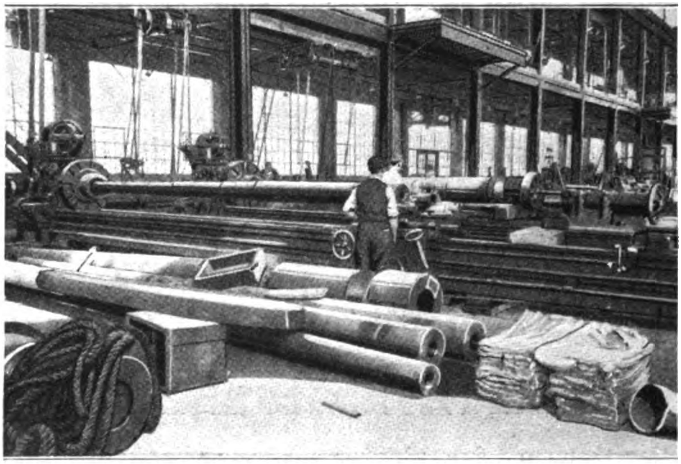


Of probable interest to dairymen is a flexible pulley lately developed for engine-operated cream separators. It permits gradual, smooth starting without belt shifting, and absorbs the shocks transmitted from a gasoline engine. The spokes are made of resilient metal and bend when subjected to a sudden jerk or pull. They are hinged at the hub and fitted with shoes that engage the rim of the wheel frictionally.

ℭBased on the pre-war building record of 385,000 residences a year, there is a present shortage of 700,000 residences caused by the low construction figure of the last four years. There is an equivalent shortage in other building lines. The normal annual value of building operations in the United States is $3,000,000,000.

LONG LATHES REQUIRED TO BORE BIG GUNS

In the great shops, so carefully guarded during the war, where the army's and navy's big guns are made, the long lathes attract special attention. Some of these are shown in the accompanying photograph, the two in the foreground being 28-ft. machines. The first one is boring a 3-in. gun tube and the second one is turning a 3-in. gun jacket, which eventually will be shrunk onto the tube.



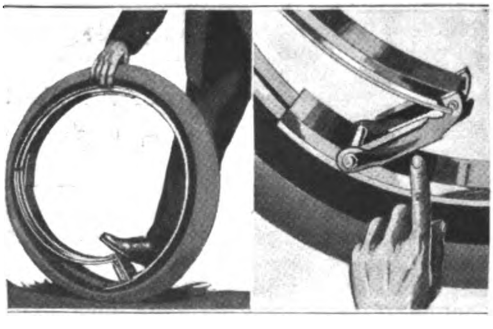
Making Big Guns for the Government: The 28-Foot Lathe in the Foreground is Boring a Three-Inch Gun Tube, and the One Just beyond It is Turning a Three-Inch Gun Jacket

SAND BARS AT FIRE ISLAND SHIFT THEIR PLACES

The sand is creeping up on Fire Island. The narrow key that lies just south of Long Island has been shifting its landmarks for years. That the changes are not confined to the visible terrain is manifested by the stranding of ships on strange bars off Great South Bay Beach. Here it was that the transport "Northern Pacific" went ashore, a few miles east of Fire Island lighthouse. Almost four miles inland from Point Democrat the lighthouse stands; and it was built out in the water. It has not moved; the sand has merely come up and surrounded it. The old baymen know the bottom foot by foot, but even they can hardly keep track of the almost hourly changes wrought by the creeping sands. And when a ship does go aground, the sand seizes upon it and piles in around it until refloating is no small task. Strandings are frequent here, but casualties are few because the shore is hospitable to shipwrecked mariners.

SEGMENTED AUTO RIM PERMITS QUICK CHANGE OF TIRES

Real novelty is found in a new type of motor-car rim that permits a tire to be changed quickly without resort to the usual tools and muscular energy. The rim consists of three hinged sections, and when removed from a wheel, is instantly collapsed by bouncing the tire lightly against the floor or ground. It is as easily replaced, for by pressing against one of the hinges with the foot, the rim assumes its natural contour, and locks. Old rims can be converted to the new form.

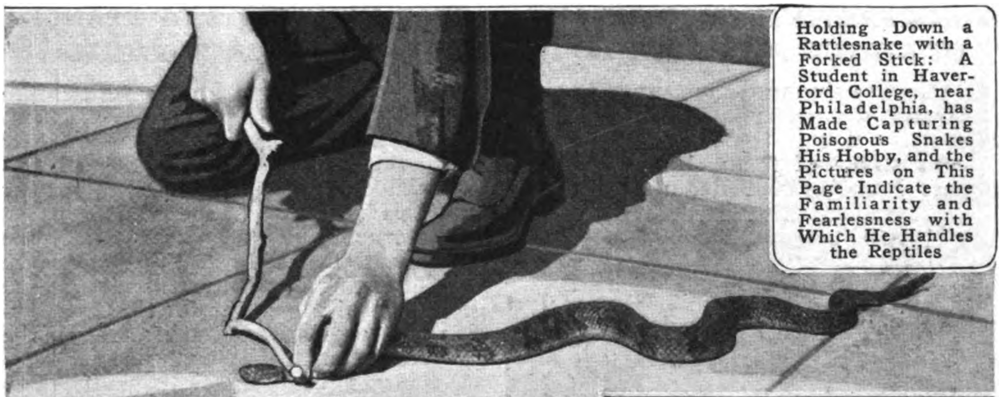


At the Left is Shown How Easily the Rim is Replaced, While at the Right Is a Close-Up View That Explains How the Sections are Hinged

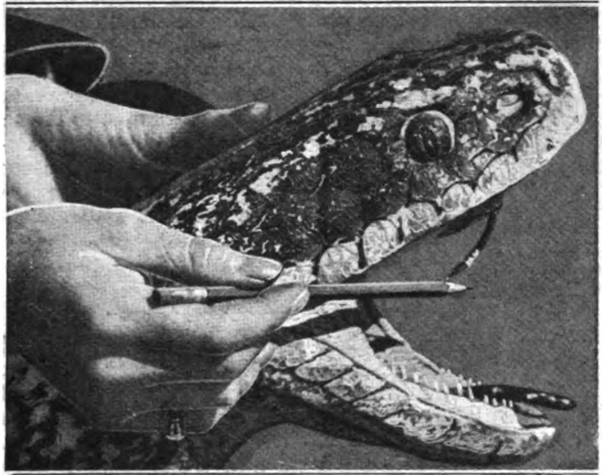
HOT-AIR DRYING PROCESS FOR FOOD PRODUCTS

An iron cylinder, 16 ft. in diameter, in which revolve two turbine-driven metal wings, is the mechanism used in a new European process of drying eggs, fruit juice, blood, and the like. The fluid, beaten to a froth, is dried by a continuous current of hot air through the cylinder. The dried products, in powder form, are soluble in water and undergo no chemical change. The early erection is announced of plants of this kind for handling 140,000 eggs a day. The powdered food will keep indefinitely.

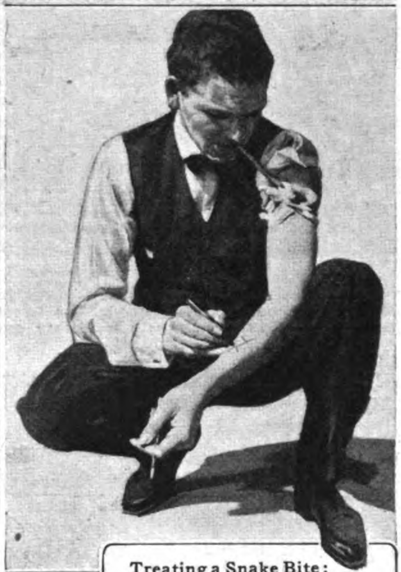
AMATEUR DISPLAYS SKILL AS SNAKE CHARMER



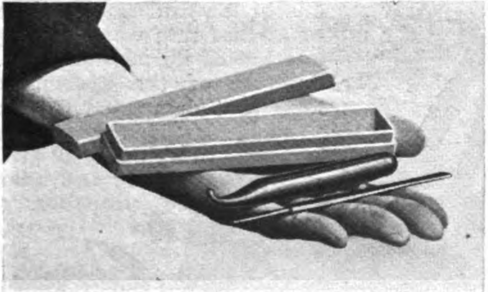
Holding Down a Rattlesnake with a Forked Stick: A Student in Haverford College, near Philadelphia, has Made Capturing Poisonous Snakes His Hobby, and the Pictures on This Page Indicate the Familiarity and Fearlessness with Which He Handles the Reptiles



Using a Large-Scale Model of a Rattler's Head to Indicate the Location of a Poison Fang: When the Jaws are Closed the Member Lies Flat against the Roof of the Mouth, While the Opening of the Jaws Causes It to Swing Downward So That It Enters the Flesh When the Snake Strikes



Treating a Snake Bite: After the Bandage has been Bound Tightly about the Arm, the Amateur Snake Charmer Holds Its Free End in His Teeth While He Cuts about the Wound and Applies Permanganate of Potash



The Daring Young Performer has been Bitten a Number of Times and So Always Carries This Anti-Snake-Poison Outfit with Him When He is Handling Venomous Specimens. It Consists of a Scalpel for Making Incisions about the Bite, and a Vial Containing Permanganate of Potash

A Handful of Rattlesnake: This Holding of a Coiled Rattler in the Outstretched Palm Is One of the Stunts of the Young Performer Which Always Makes His Fellow Students Gasp and Shudder. They Know, However, That He Understands Just What to Do the Instant There Is Any Sign of Hostility

ROME PRESENTS GOLD REPLICA OF STATUE TO MRS. WILSON

Distinctive among the multitude of gifts to President and Mrs. Wilson from Europeans is a small gold replica of the famous statue of the wolf suckling the infants Romulus and Remus, the traditional founder of Rome, and his brother. The costly souvenir, which was presented to Mrs. Wilson by the mayor of the Eternal City, is inclosed in a richly finished cabinet. Modern Romans are particularly proud of the great age of their city and delight to keep alive its many legends, including the story of the nurture of the babes by a wolf.

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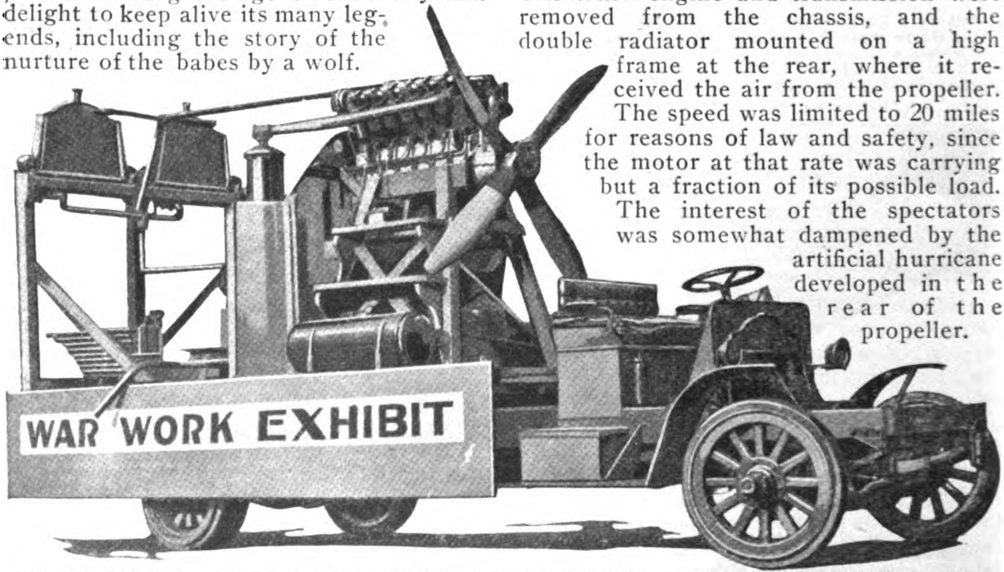
Gold Replica of Famous Statue, Presented by the Mayor of Rome to Mrs. Wilson: The Letters Stand for Latin Words Meaning "The Senate and People of Rome"

WAR INDUSTRIES OF FRANCE PLAN PEACE PURSUITS

Industrial plants in France which were devoted to the manufacture of war materials are changing the nature of their products with as little friction and loss as possible, being assisted in solving their problems by the Department of Industrial Reconstruction, which was formerly the Armament Department. Some of the changes being made are the use of the great arsenal at Roanne for the construction and repair of railway material, the transformation of the explosive factories at Bourges into chemical plants with the production of fertilizers in view, the alteration of woodworking shops of the air-craft department for sash and door and other building work, and the manufacture of telegraph and telephone material and other metal products by plants which have engaged in similar lines. These changes include both the converted industries and the factories built expressly for war work, and apply both to the liberated regions and to the rest of France.

AIR PROPELLER AND MOTOR DRIVE HEAVY TRUCK

A four-blade airplane propeller, coupled to a 450-hp., 12-cylinder Liberty motor. pulled a three-ton truck chassis around Detroit streets at 20 miles an hour in a manufacturer's war-work demonstration. The truck engine and transmission were removed from the chassis, and the double radiator mounted on a high frame at the rear, where it received the air from the propeller. The speed was limited to 20 miles for reasons of law and safety, since the motor at that rate was carrying but a fraction of its possible load. The interest of the spectators was somewhat dampened by the artificial hurricane developed in the rear of the propeller.



This Three-Ton Truck, with Its Engine and Transmission Removed, was Driven about Detroit Streets at 20 Miles an Hour by the Four-Blade Airplane Propeller and 450-Horsepower Liberty Motor

MECHANICS ASSEMBLE BIPLANE QUICKLY AT TEXAS FIELD

DURING "open house day" at Rich Field, Waco, Texas, some weeks ago, this two-seater army biplane was uncrated and completely assembled in two hours and 16 minutes. A crew of five accomplished the feat. The speedy quintette, their task finished, are seen standing about the plane, while the flier who tried out the hastily but perfectly assembled machine leans over the rear cockpit.

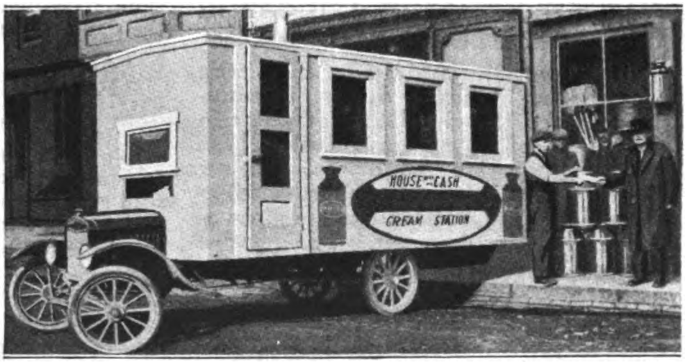
USE OF BALES SAVED LUMBER AND GAVE ARMY SANDBAGS

Clothing and equipment for the American Expeditionary Forces was packed by baling instead of boxing or crating. The sum saved by this substitution amounted to more than $50,000,000. Cargo space of 8,180,000 cu. ft. was saved, or 204,500 shipping tons, equaling the capacity of 41 standard cargo ships. The lumber necessary for crates and boxes would have been 58,000,000 ft., which amount is estimated to take 30 years to grow. The quantity of burlap used for baling, which allowed this enormous saving of wood, was 2,770,000 yd., the jute grown in one year being sufficient to manufacture that amount. The burlap was cut the right size to be made into sandbags for military use, and from the total shipment of 1,000,000 bales of goods enough burlap was taken to make 4,000,000 sandbags.

¶The statue of Lincoln, by St. Gaudens, is to be placed in the Canning inclosure at Westminster, London, according to a recent decision of an American commission appointed to choose between it and the much-discussed statue by Barnard.

TRUCK EQUIPPED FOR TESTING CREAM WHEN BOUGHT

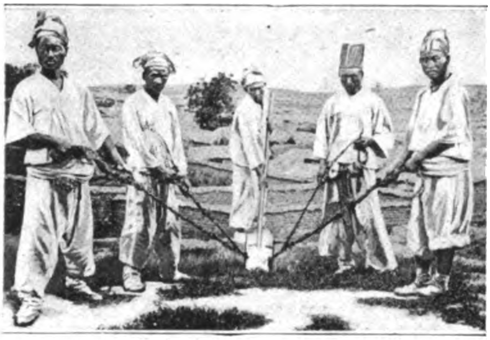
The slogan "cash and carry" has been adopted by a buyer of cream who has built a special body on his light car, for the purpose of running his business on the new basis. The body, resembling that of a van, is of wood with large windows on either side and has a capacity for 40 five-gallon milk cans, in addition to a complete cream-testing outfit installed in the car. The novel-looking conveyance is driven from farm to farm, and the cream purchased is tested and paid for on the spot, so that there is no ground for complaint. The plan also does away with a more or less elaborate system of bookkeeping.



Auto Truck Equipped by an Ohio Dealer in Dairy Products for Testing Cream at the Place Where It is Purchased: The Buyer Pays Cash in Each Case

NEED FIVE MEN TO OPERATE SPADE IN CHOSEN

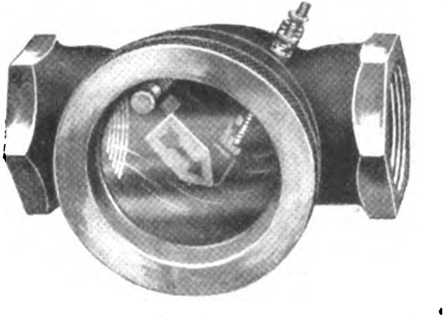
Things are done differently in Chosen. In parts of that country, where primitive methods still prevail, spading a garden, for instance, is often a five-man job. Four coarse ropes of twisted reeds are fastened to the heavy spade, and after one of the five laborers has thrust it into the ground the other four jerk it along. stirring up the earth, after a fashion.



Primitive Land Cultivation in Chosen (formerly Korea): The Man at the Rear Operates the Handle of the Implement While the Other Four Jerk the Blade Along, Loosening Up the Soil

DUAL CIRCULATION INDICATOR FOR EXPLOSION MOTOR

Instant warning is given by an electric and sight-flow indicator of British manufacture, when the circulation of water in the jackets of a marine or other type internal-combustion motor falls below normal. The instrument is provided in different sizes, that accommodate pipes of from ¼ to 4-in. diameter. The relative amount of water passing the glass is shown by the angle assumed by an arrow fixed to a hinged flap. When the circulation is normal, electric contacts are held against the latter member. The tension of springs, however, overcomes the pressure of the water when the force of the latter drops below the safety point, moving the contacts away from the flap and causing the warning signal to function.



BY COURTESY OF MOTOR SHIP AND MOTOR BOAT

Visual and Electric Indication of the Condition of the Flow of Water in the Circulating System of an Internal-Combustion Engine is Given by This Instrument

CHOKED BY TOY BALLOON LODGED IN LARYNX

The danger that lies hidden in the things generally regarded as most innocent and harmless was made distressingly apparent by the death of a little Brooklyn girl of six years, who was strangled by a common toy balloon, purchased for a nickel. With the neck of the thin rubber bag in her mouth, the child was amusing her companions by blowing it up and suddenly drawing the air from it again. The end of the balloon became lodged in her throat, and the next exhalation so expanded it that it completely filled her mouth, shutting off all air. Unable to make a sound, her predicament was not realized until, in a few seconds, she fell unconscious, and the physician immediately called reported that death had probably been almost instantaneous. While such an accident is fortunately unusual, it carries a caution as to the devices used by small children in play.

PAUPERS' LEGACY TO CITY SOLD AT AUCTION

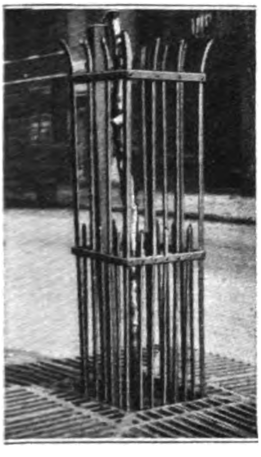
In Pittsburgh, Pa., some days ago the trinkets of the city's pauper dead were sold at public auction. The sale itself was a commonplace affair, such as is held in nearly every large city occasionally. For the seeker of human interest, however, it offered bountiful leads to stories of pathos and tragedy. The meager personal property of scores of unfortunate men and women deceased was sorted, classified, and put on the block for the highest bidders. The articles were the worldly possessions left by known and unknown individuals who had died in Pittsburgh charitable institutions during the 26 years prior to 1914, and included some 400 watches, a large number of keys, penknives, buckles, lodge emblems, scarfpins, false teeth, and a miscellaneous collection of odds and ends. Bibles printed in many languages, and coins from the four corners of the earth, were listed. A few hundred dollars of United States money, part of the paupers' legacy, was turned into the city treasury.

FIFTY THOUSAND SOLDIERS NATURALIZED ABROAD

Out of the vast army which the United States sent to Europe, 50,000 soldiers, who were aliens or alien enemies when they left this country, have been made citizens. This remarkable record, evidencing a splendid loyalty, has been made possible through the efforts of the Bureau of Naturalization which sent its representatives abroad to confer the privileges of citizenship on all foreigners in our armed forces. The detailed record of each soldier, possessed by the army, permitted the work of naturalization to be carried on rapidly but nevertheless thoroughly. Even alien enemies, who had joined our forces before present restrictions were in force and could prove their loyalty, were permitted to become citizens and will enjoy all the privileges of Americanism in civil life.

TREES IN CROWDED CITY HAVE SPECIAL PROTECTION

Authorities in New York City have gone to unusual trouble and expense to make certain trees grow in much-frequented paved areas. Each tree is planted in a hole, measuring 4 by 6 ft. and 3 ft. deep, and the roots are covered with properly enriched soil. Over the replaced dirt is laid a two-piece iron grating, having an 18-in. hole in the center for the tree. A special implement, which can be inserted through the grating, is used to mulch the soil, onto which fluid fertilizer is poured at intervals. Heavy iron pickets surround the tree trunk, a necessary protection in a crowded city.



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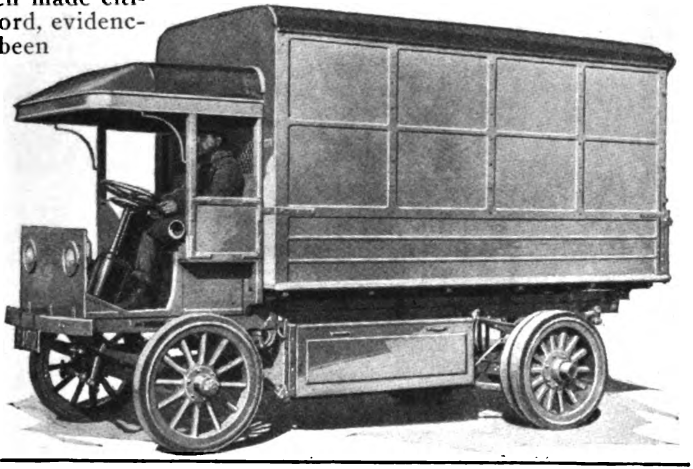
TRUCKS OF IMPROVED DESIGN FOR EXPRESS COMPANY

Several improvements characterize the new type of truck bodies which have been developed for the American Railway Express Company. In place of the screens and side curtains used in the old style of express carriers are eight panels on each side, which can be removed individually like window glass and replaced in case of damage. No mudguards are provided but at the lower edge of the sides of the body are iron "fins" which serve as buffers for side blows.

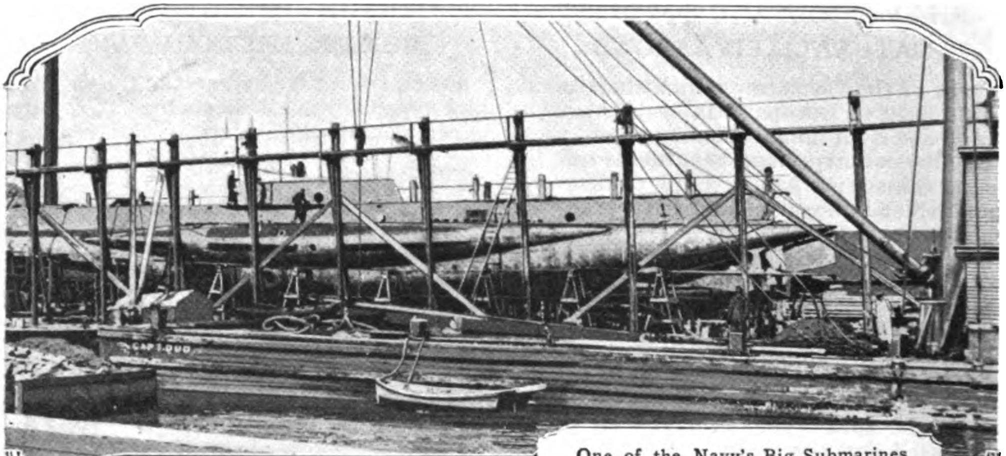


New Type of Express Truck: In Case Any One of the Panels in the Side of the Body is Damaged, It can be Removed and Replaced with Another

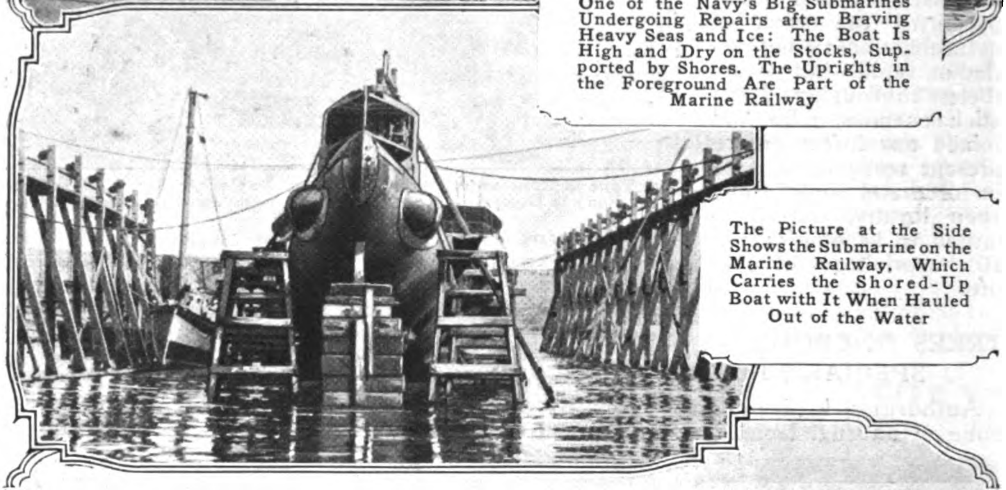
TALK THROUGH OFFICE PHONE WITH AIRMEN ALOFT

The first official demonstration of a two-way conversation between a person using an ordinary telephone line and an airman in flight was made recently in Washington. An officer on the ground talked into a desk telephone connected with a local wire, which, in turn, was connected with apparatus at a radio station. This permitted the flier in a machine fitted with suitable instruments and the man at the desk phone to converse freely. Wireless apparatus for carrying on one-way conversations has been in use for some time by aeroplane commanders and others in directing men in the air. Now, it is stated, by making the proper connections it undoubtedly will be possible for a man in New York, for example, to talk with a flying airman in San Francisco, or for two flying airmen, thousands of miles apart, to converse.

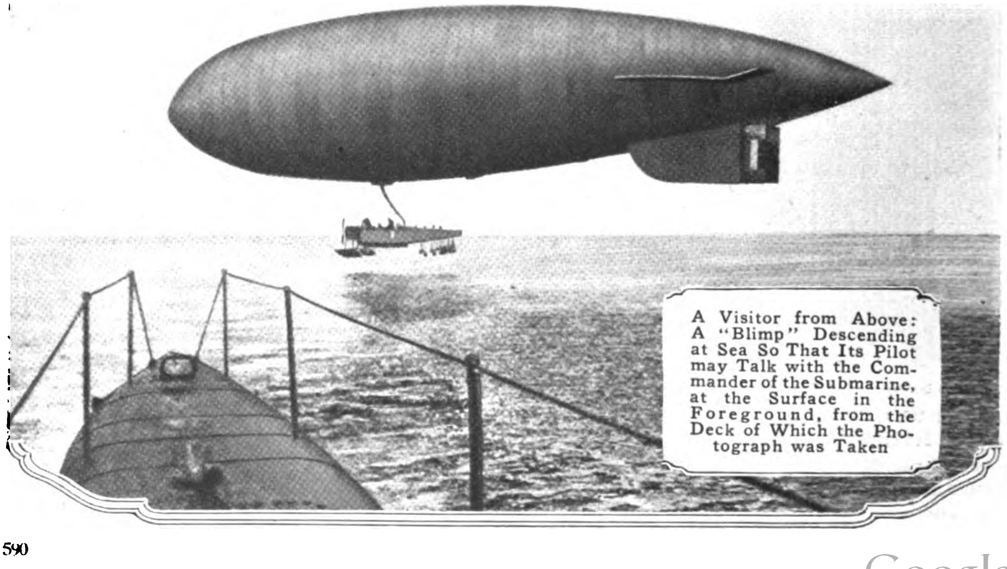
AMERICAN SUBMARINES AND DESTROYERS



One of the Navy's Big Submarines Undergoing Repairs after Braving Heavy Seas and Ice: The Boat Is High and Dry on the Stocks, Supported by Shores. The Uprights in the Foreground Are Part of the Marine Railway

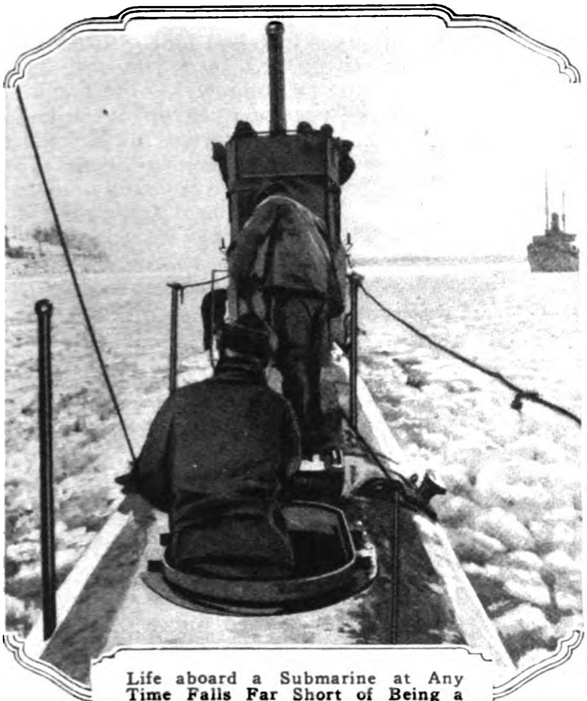


The Picture at the Side Shows the Submarine on the Marine Railway, Which Carries the Shored-Up Boat with It When Hauled Out of the Water

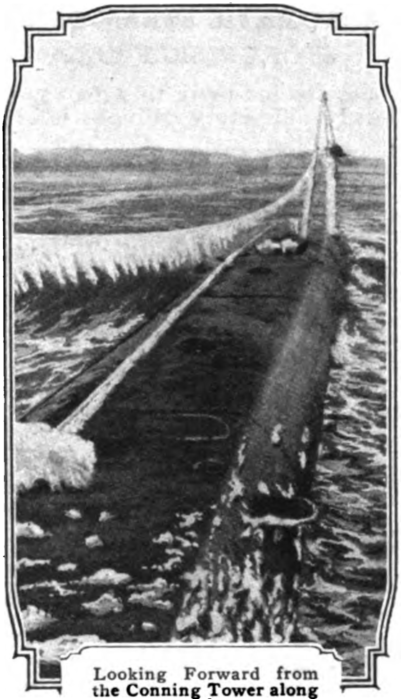


A Visitor from Above: A "Blimp" Descending at Sea So That Its Pilot may Talk with the Commander of the Submarine, at the Surface in the Foreground, from the Deck of Which the Photograph was Taken

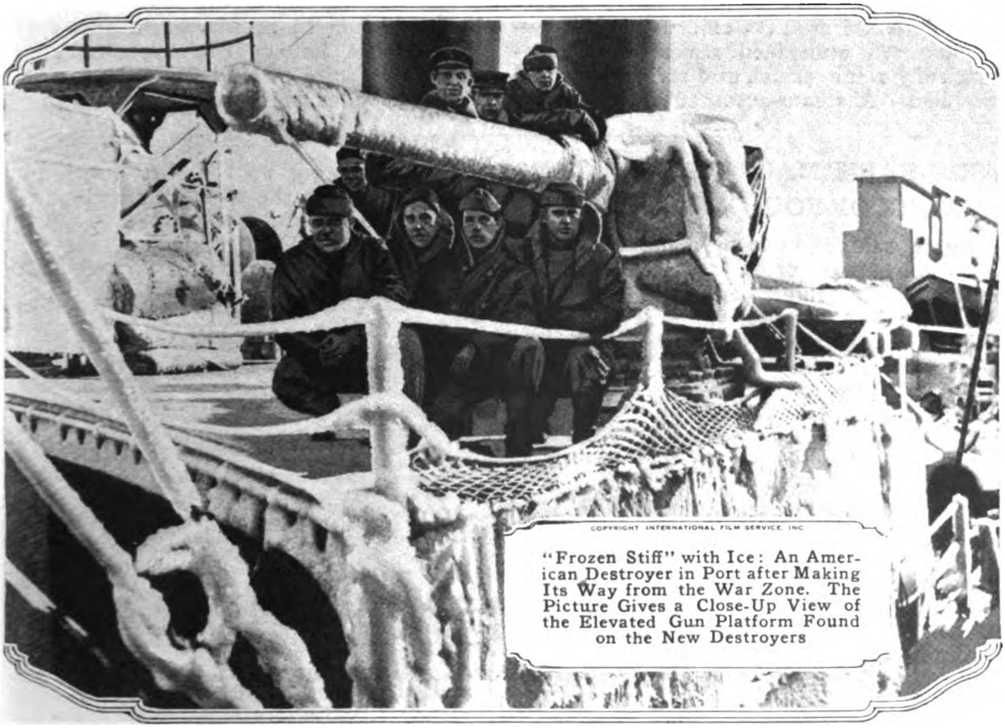
BATTLE WINTER ICE AND STORMS AT SEA



Life aboard a Submarine at Any Time Falls Far Short of Being a Round of Pleasure, but in War Time and Wintertime and a Sea of Ice Such as This, It Means Downright Hardship



Looking Forward from the Conning Tower along the Deck of a Submarine under Way, Showing the Guide Cable Coated with Ice



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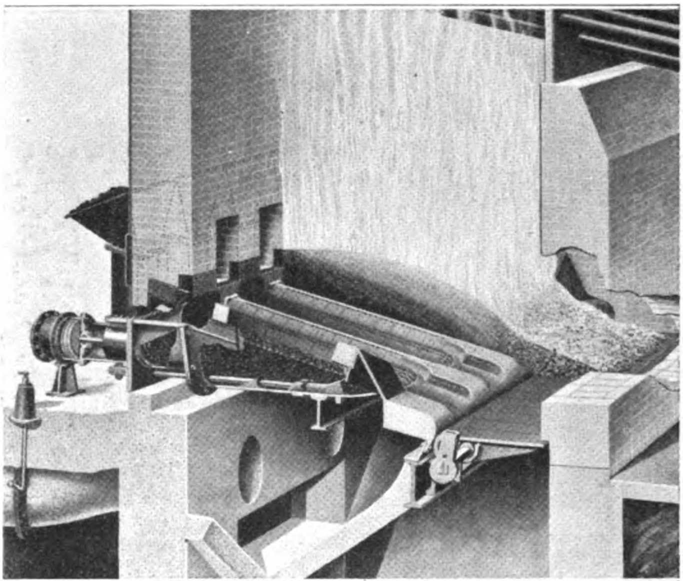
"Frozen Stiff" with Ice: An American Destroyer in Port after Making Its Way from the War Zone. The Picture Gives a Close-Up View of the Elevated Gun Platform Found on the New Destroyers

AUTOMATIC STEAM-OPERATED STOKER SELF-CLEANING

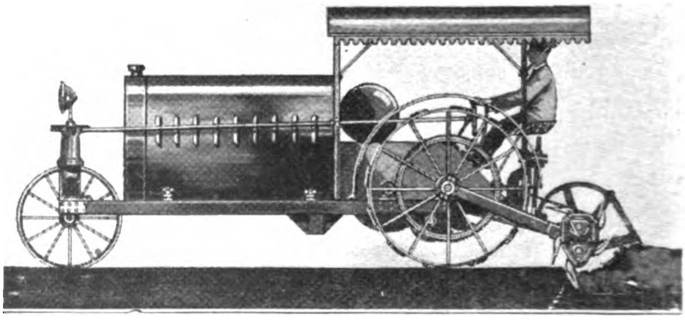
Service for more than two years under widely differing conditions is claimed to have demonstrated the efficiency of a power-operated underfeed stoker that automatically removes ash and refuse from the fire bed. A steam-actuated ram supplies the magazine intermittently with coal from a hopper installed at the front. As the coal is pushed into the magazine, which forms the support for the fuel bed, it raises the previous charge upward and rearward, underfeeding fresh coal to the fire. The latter, subjected to the intense heat from the zone of incandescence, gives up its volatile gases before igniting. Air coming from the tuyères mixes with the gases and rises through the heated fuel, while the coke that has formed is forced, by the new charge of coal, toward the top of the bed to burn with the rising gas mixture. The whole burning bed is gradually moved toward the back until, as ash and refuse, it accumulates on a balanced dump plate and is eventually dropped into a pit, or through chutes to cars. Steam automatically controls the supply of coal and air fed to the fire, a slight drop in pressure causing the delivery of fuel to be increased, and a rise in pressure having the opposite effect, so that in spite of load variations, a very uniform boiler pressure is maintained.



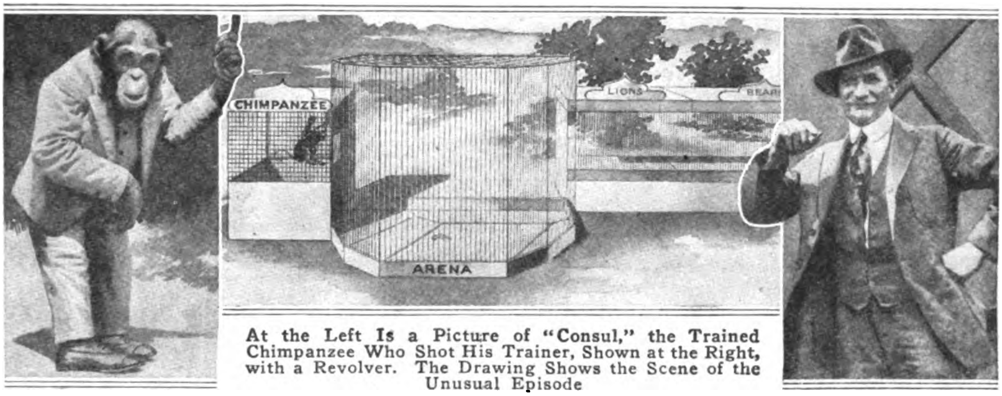
Coal Supplied from the Hopper at the Front is Pushed into the Magazine by the Steam Ram, as Shown at the Left. Gradually the Ash and Refuse is Moved onto the Balanced Dump Plate Shown at the Right

NEW FARM MACHINE PERFORMS WORK OF FOUR IMPLEMENTS

Tests, said to have been most satisfactory, have been made of a new tractor-driven farm implement which does the work of a plow, disk, harrow, and pulverizer in one operation, thereby greatly lessening the labor involved in preparing a field for planting. The special feature of the invention is an ingenious sprocket, which sends a series of spades into the ground vertically. These are staggered across the 5-ft. span of the machine just behind the drivewheels. As each spade enters the ground its thrust backward in digging up the dirt helps, to a degree, to drive the whole implement forward. The ground is disturbed to a depth of 12 in., if desired. Surface vines and weeds are chopped up and turned under.



New Engine-Driven Farm Implement Which Does the Work of a Plow, Disk, Harrow, and Pulverizer at One Operation, Spading a Path Five Feet Wide as It Moves Along



At the Left Is a Picture of "Consul," the Trained Chimpanzee Who Shot His Trainer, Shown at the Right, with a Revolver. The Drawing Shows the Scene of the Unusual Episode

CHIMPANZEE REPELS TRAINER WITH COWBOY TACTICS

Poe on the one hand and Kipling on the other have given modern literature two classic accounts of murders executed by domesticated apes. In each of these remarkable stories, the hairy brute made use of his enormous muscular strength. From an eastern city comes verified information of a near tragedy in real life, which in its way is even more striking than either of the fictional tales aforementioned.

"Consul," a trained and mannishly attired chimpanzee belonging to a troupe of performing animals, was seated in his cage in view of the arena awaiting his turn. The trainer, in putting some unruly bears through their evolutions, twice had occasion to discharge a revolver while enforcing his commands. This was observed by the ape. The firearm, instead of being returned to the trainer's pocket, was left in the arena when the bears completed their work.

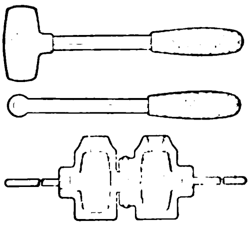
All went well with the chimpanzee and his act until he spied the revolver. Upon sighting it, however, the animal picked it up and attempted to slip it in a pocket of his clothing. He was frustrated in this by the trainer, who advanced and attempted to seize the weapon. With alacrity befitting a practiced cow puncher of early western days, the ape pointed the revolver at the man and fired. Fortunately for the latter—and perhaps for both—the cylinder was loaded with blank cartridges, and the trainer sustained nothing more serious than a powder burn. The shot may have been fired in the spirit of play, to repel resistance, or accidentally. In any case, here is an authentic instance of an anthropoid ape shooting a man with a firearm.

ITALIAN DISABLED SOLDIERS MAKE DECORATIVE DESIGNS

Interesting work by Italian wounded who have found profitable employment in designing and printing paper and fabrics for interior decoration has been cited as offering a suggestion to the Federal Board of Vocational Education, in charge of training our disabled soldiers to be self-supporting. Most of this work is not heavy and therefore particularly suited to handicapped men. Several such men now taking instruction in or near Milan have produced about 100 designs which are being used in wall paper, hangings, hat boxes, etc. All are characterized by a freshness and individuality that is most pleasing.

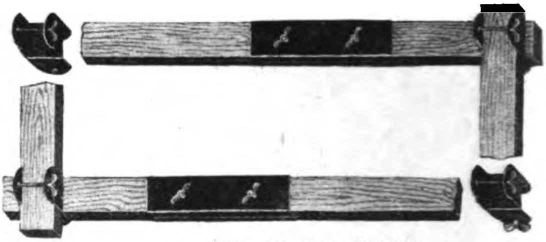
LEAD HAMMER FOR SHOP USE MADE WHENEVER NEEDED

Lead hammers, for shop use on work which would be damaged by a hard-faced hammer, are frequently made by workmen without proper equipment, resulting in loss of time. A device designed to make the process rapid and easy consists of a two-part hinged mold for the lead, and a separate handle with an eye on the end that is inserted into the mold, and an aluminum-faced grip on the other end. Different sizes of molds provide lead hammers of 1-lb., 2½-lb., and 5-lb. weight. The lead head is readily melted off in a few minutes when it becomes upset beyond usefulness, and a new and perfect head melted on.

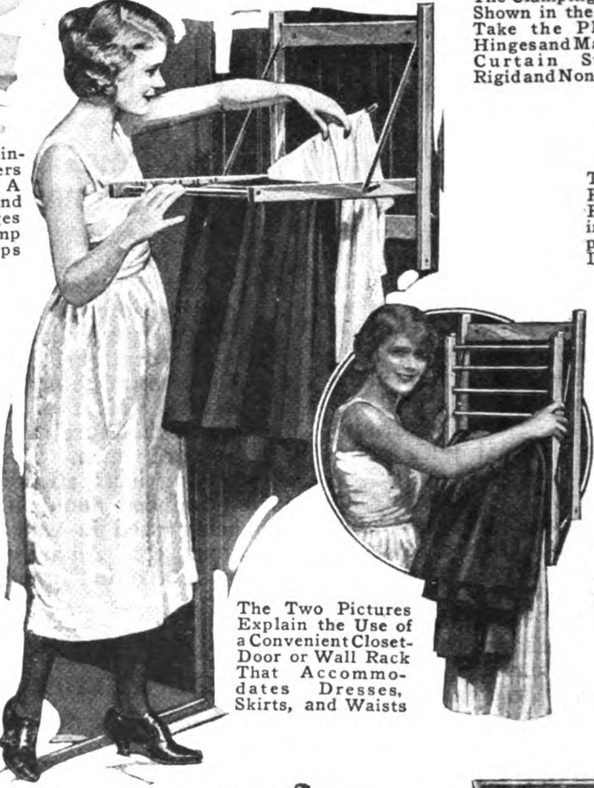


SOME NOVEL AND LITTLE-KNOWN ACCESSORIES

For Retaining the Covers on a Bed: A Hook at One End of a Tape Engages the Spring, and a Clamp at the Other End Grips the Bedding



The Clamping Sleeves Shown in the Middle Take the Place of Hinges and Make This Curtain Stretcher Rigid and Nonsagging

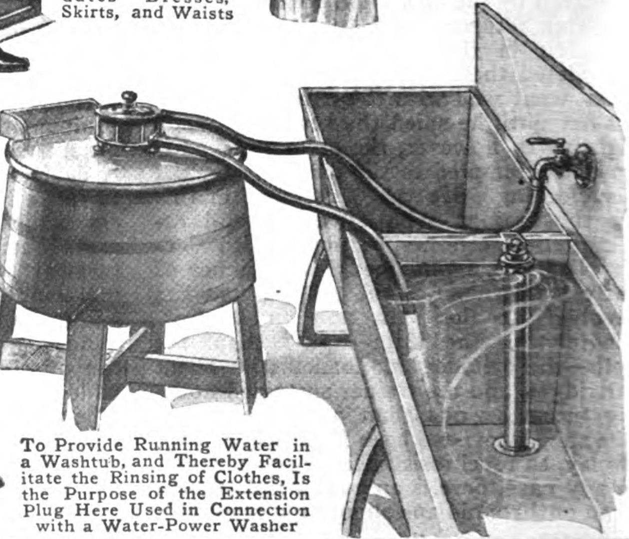


The Two Pictures Explain the Use of a Convenient Closet-Door or Wall Rack That Accommodates Dresses, Skirts, and Waists

The Spiral Spring Fitted in This Special Force Cup Keeps It in Shape and is Supposed to More Than Double Its Effectiveness and Life

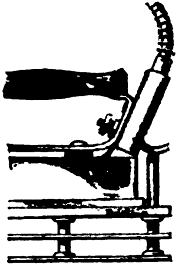
Receiving an Incandescent Lamp of Any Type, This Light-Regulating Socket Gives a Bulb a Range of 12 Different Intensities

A Straight Chair with Hinged Rear Legs, Intended on Occasions to Serve as a Near-Rocker in the Manner Pictured

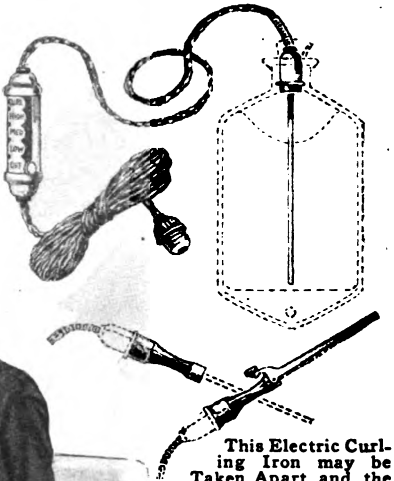


To Provide Running Water in a Washtub, and Thereby Facilitate the Rinsing of Clothes, Is the Purpose of the Extension Plug Here Used in Connection with a Water-Power Washer

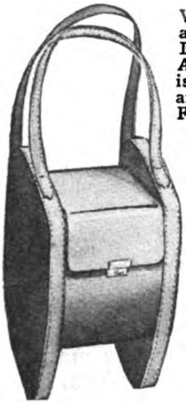
INTENDED FOR THE HOME AND ITS MEMBERS



While the Iron Is on the Stand, as at the Side, the Current is Disconnected. When Lifted, as Above, a Spring within the Plug is Released and Contact Formed

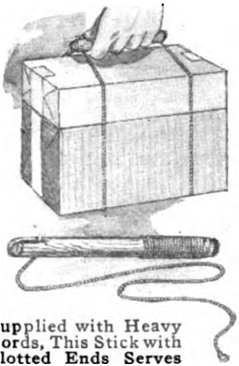


This Electric Curling Iron may be Taken Apart and the Shank Holding the Heating Element Screwed into a Water Bottle to Heat the Contents



A Striking Novelty for the Armistice Season: A Handbag Fashioned after the Lines of a British Tank and Richly Finished in Black or Blue Pin-Seal Leather

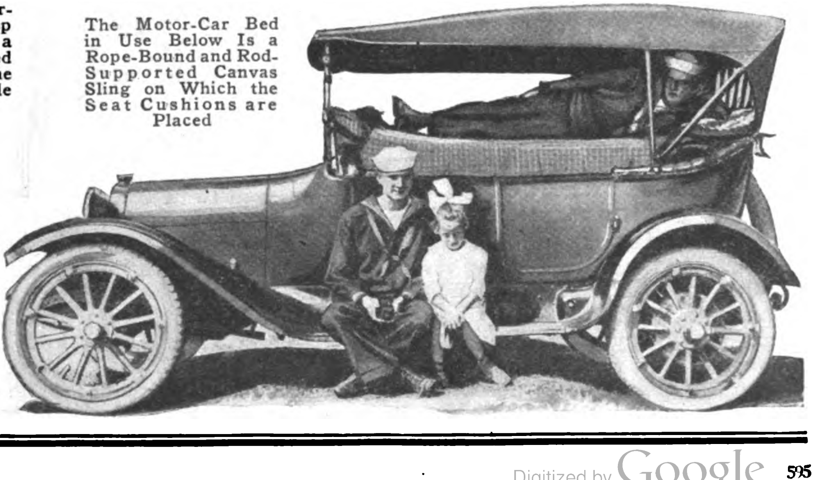
The Newest Aid for Dish Washing: Hot Water Passes through the Soap Container at the Top and Discharges through the Brush. By Turning a Handle, Clear Water for Rinsing is Sprayed



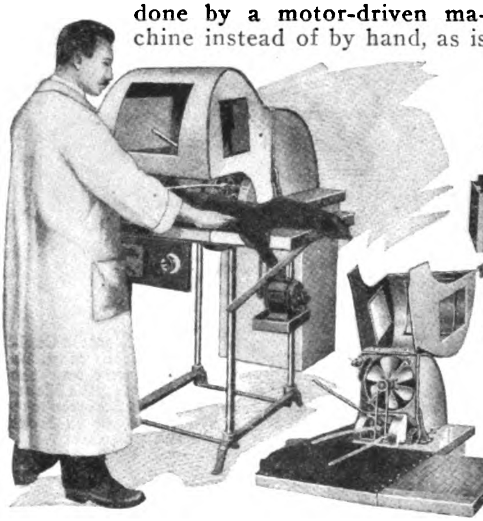
Supplied with Heavy Cords, This Stick with Slotted Ends Serves Conveniently as a Carrier for Small Packages and Bundles

A Lasting and Serviceable Dust Mop Consisting of a Sheep's Pelt Wrapped on a Flexible Frame to Which a Handle is Attached

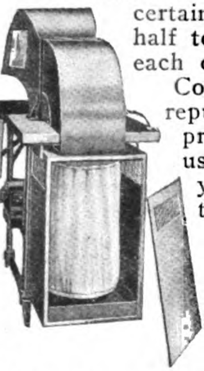
The Motor-Car Bed in Use Below Is a Rope-Bound and Rod-Supported Canvas Sling on Which the Seat Cushions are Placed



FUR-BEATING MACHINE HAS VACUUM FEATURE



A New Motor-Driven Fur-Beating Machine is Shown at Work at the Left. In the Center Picture the Hood is Tipped Back, Exposing Flails and Fan to View



Rear View of Machine, with Back Removed, Showing Cloth Receptacle for Dust and Hairs

The beating of furs to soften them and remove dust and loose hairs can now be done by a motor-driven machine instead of by hand, as is common practice, at a saving of much labor and in a most sanitary manner. The outfit is portable and does not occupy a large amount of space. The fur to be treated is placed on a padded counter which can be extended by raising leaves at either side. Above the counter is an overhanging hood having windows in its sides through which the renovation process can be observed. Turning a switch, causes three rattan sticks to rise and fall with a snappy movement much like hand-beating. The motor which drives the sticks also operates a fan, immediately above them, for drawing the dust into a bag inclosed in a chamber at the rear. By means of a controller the operator can regulate the speed of the machine to suit the fur being treated.

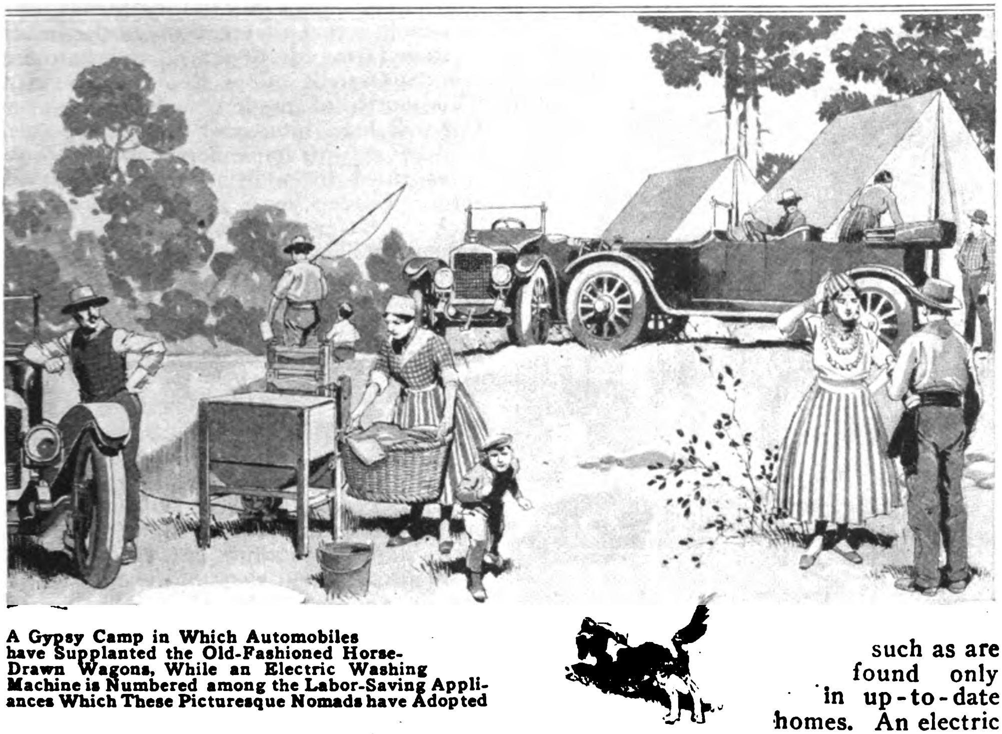
FLAX-HANDLING MACHINES AID IRISH INDUSTRY

Flax manufacture, oldest of textile industries, has received new impetus in Ireland through the development of machines that perform most of the operations previously done by hand. The harvest of flax is pulled up by the roots, not cut, and simple but ingenious pulling machines are already in use. A deseeding, or rippling, machine replaces the slow hand process of removing the bolls, and delivers the stalks straightened and clean. Retting tanks, which loosen the woody core from the fiber by soaking in water until fermentation is completed, are under cover, protected from weather changes, and the flow and temperature of the water are controlled with automatic certainty. Eight to eight and a half tons of flax are handled in each of the double tanks. Constant flow eliminates the repulsive odors of the pond process of retting, and the use only of the previous year's crop allows rippling to be done at the most desirable time. The machines for scutching, or breaking the rotted woody core away from the fiber, require the attention of skilled and experienced workers, as this is the most important part of the process. When it is completed, the cleaned flax is ready for market. Tow is made from the end not used for flax, and a meal, called "linfoo," is produced by grinding the seed shell, leaving no waste whatever. It is anticipated that the improvements will popularize flax growing by increasing the marketability of the crop.

BIBLE REFERENCE IN CARS PROMOTES TRUTHFULNESS

Placards containing the words "Proverbs XII:19" and "Tell the Truth" have been displayed on the front of all local cars of the Philadelphia Rapid Transit Company as a feature of a "truthfulness" campaign. The company has been blamed for numerous accidents alleged to be the result of the skip-stop plan, but investigation has shown that the testimony of many witnesses could not be substantiated, or was false. Of late, testimony has proven more reliable, it is said, and the placards are given much credit therefor. The verse in Proverbs reads: "The lip of truth shall be established forever; but a lying tongue is but for a moment."

AUTO-RIDING GYPSIES USE UP-TO-DATE APPLIANCES

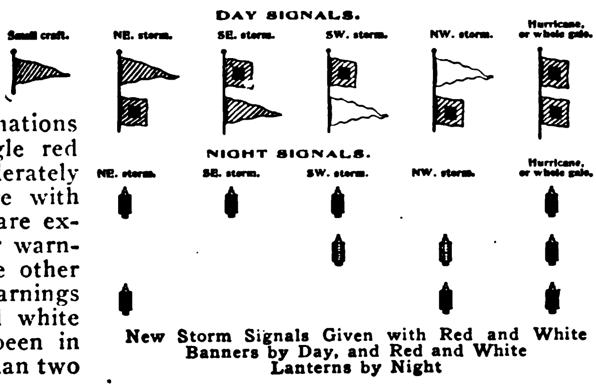


A Gypsy Camp in Which Automobiles have Supplanted the Old-Fashioned Horse-Drawn Wagons, While an Electric Washing Machine is Numbered among the Labor-Saving Appliances Which These Picturesque Nomads have Adopted

The use of automobiles by gypsy bands, which has already attracted not a little public notice, appears to have been but the first step in modernizing the whole life of these picturesque nomads. Recent reports from a gypsy camp in Indiana tell of the use of appliances there such as are found only in up-to-date homes. An electric washing machine, run by power generated by one of the band's automobiles, is perhaps the most conspicuous innovation. When the wanderers are on the move the machine is securely strapped to one of the cars. It is said heat and cold-retaining bottles are among the kitchen utensils.

NEW STORM SIGNALS ON GULF AND ATLANTIC COASTS

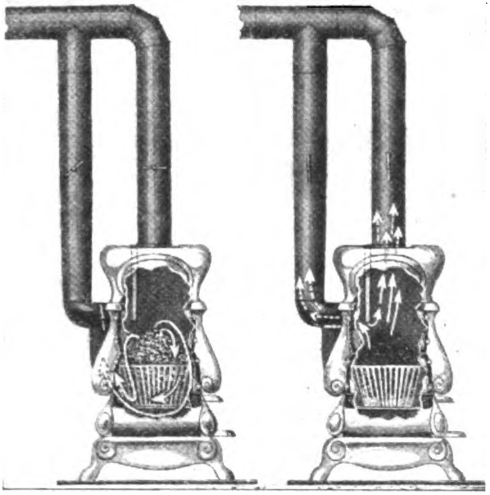
A new system of storm warnings for vessels was put into effect on the Atlantic and Gulf coasts the first of the year. As the accompanying illustration shows, the day signals are given with red and white pennants, and square red flags, having black centers, used in the combinations indicated. The display of a single red pennant alone indicates that moderately strong winds which will interfere with the safe operation of small craft are expected. No provision is made for warning small craft at night. For the other storm signals, however, night warnings are given by the use of red and white lanterns. These warnings have been in use on the Great Lakes for more than two years, and, eventually, they are to be introduced on the Pacific coast also.



New Storm Signals Given with Red and White Banners by Day, and Red and White Lanterns by Night

DEVICE ADAPTS BASE BURNERS TO USE OF SOFT COAL

The government's restrictions on hard coal have caused the Fuel Administration to recommend the use of a simple attachment for hard-coal base burners which makes them capable of burning soft coal satisfactorily. The magazine in the top of the stove is removed and a special lid is substituted for the old one. Extending downward from the new lid to the fire pot is a 1¼-in. air-supply pipe, while an auxiliary stovepipe is provided which extends upward from a large hole in the lid and connects near the ceiling with the regular pipe. The dampers in the auxiliary pipe and the air-supply pipe are left open about 15 minutes after putting on fresh coal so that the smoke is disposed of rapidly. During this period, when the coal is coking, the auxiliary pipe radiates considerable heat. The smoke being consumed, the dampers are set to force the draft down through the fuel and the air-supply pipe partly closed.



Hard-Coal Base Burner, Minus Magazine, Provided with an Attachment for Burning Soft Coal: Left-Hand View Indicates How Dampers are Set After Coal has Coked. That at Right Shows Arrangement of Dampers during Coking Period

AID FOR FRENCH SOLDIERS WHO BECOME FARMERS

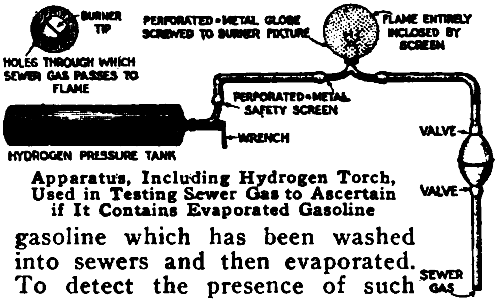
The department of Loire, in central France, has felt so keenly the need of developing its agricultural interests that it is offering remarkable inducements to soldiers to take up land. The sum of $120,000 has been voted to promote the work. A minimum of 20 to 25 acres may be allotted to men, mobilized or not mobilized, who comply with certain conditions, one of which is that they remain as the heads of their farms for 10 years. Furthermore the department offers free to each man $200 worth of modern farm machinery and will loan him, over and above this, $100 worth of implements for each 25 acres tilled in addition to the first 25 acres. Fifteen years are allowed to pay back the latter obligation. To encourage larger families, part of the loan can be canceled according to the number of children born on the farm.

OFFER PRIZE FOR INVENTION OF AEROPLANE PARACHUTE

The sum of $500 has been offered to the Aero Club of America to be used in promoting the invention of parachutes for fliers. A committee has been appointed by the club which will arrange for a competition. Men familiar with the problems of flying point out that a safety device of the character sought, if it is to be of practical value, must be so constructed and so attached that it can be utilized at any instant regardless of the position of the aeroplane and flier. While a variety of parachutes were in use during the war, their relative merits have not yet been fully determined. Valuable suggestions are expected from this contest.

LAMP DETECTS GASOLINE FUMES IN SEWERS

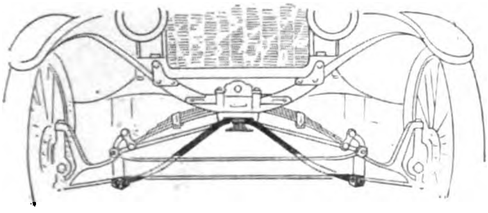
The growing number of garages has increased the danger of explosions from gasoline which has been washed into sewers and then evaporated. To detect the presence of such gases in underground passages, a lamp has been employed in Boston and elsewhere, which is similar in principle to a safety lamp. It burns hydrogen, a pressure tank being provided for the gas while placed over the burner is a brass globe having 324 perforations per square


BURNER TIP
PERFORATED-METAL GLOBE SCREWED TO BURNER FIXTURE
FLAME ENTIRELY INCLOSED BY SCREEN
HOLES THROUGH WHICH SEWER GAS PASSES TO FLAME
PERFORATED-METAL SAFETY SCREEN
WRENCH
HYDROGEN PRESSURE TANK
VALVE
VALVE
SEWER GAS

Apparatus, Including Hydrogen Torch, Used in Testing Sewer Gas to Ascertain if It Contains Evaporated Gasoline inch. Around the burner is a collar through which vapor from a sewer can be forced up into the flame by means of a suction tube attached just below the lamp and provided with a suitable bulb. To test a sewer this tube is lowered to the surface of the flowing sewage and the bulb is operated by hand. If any gasoline vapor is present, the flame, which normally is almost invisible, will take on a greenish or bluish cast.

AUXILIARY FRONT RADIUS ROD HOLDS AXLE IN ALINEMENT

Broad claims of merit are made for an adjustable radius-rod support that has been fashioned for a certain type of light car. The device is intended to keep the front axle of the machine in proper alinement and relieve driving strains. While it is sufficiently strong to prevent an axle from "crawling" back, and a radius rod from being broken thereby, it has enough resiliency to take up the shock in the event of a head-on collision and safeguard the crank case from injury. Attachment of the support is a simple matter, requiring only a few minutes of labor.



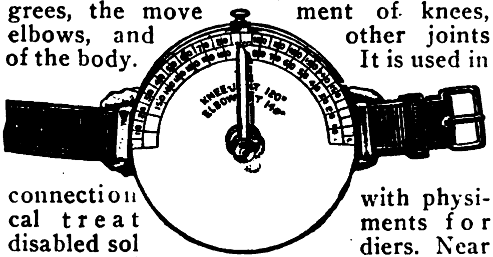
Showing the Adjustable Radius-Rod Support in Place, Bracing the Front Axle in a Way to Prevent Back "Crawling"

OVERSTOCK OF RATION CANS USED TO SHIP CEREALS

Immense tin cans, with a capacity of 100 lb. of food, were used by the War Department for packing trench rations. The armistice left the Subsistence Division with 150,000 of these special containers on its hands—and they cost $1.50 apiece. No use for them was apparent, and they usurped an enormous amount of storage space. Just at this serio-comic crisis, the government received an overseas order for 10,000,000 lb. of oatmeal and hominy. Cereals for salt-water shipment have to be packed in hermetically sealed containers. The problem of the unemployed trench cans was solved, and the cost of new containers was saved.

INSTRUMENT MEASURES EXTENT OF MOVEMENTS OF JOINTS

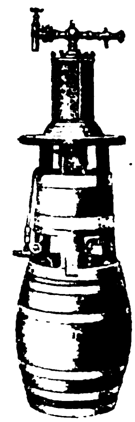
An instrument has been devised in England for measuring in terms of degrees, the movement of knees, elbows, and other joints of the body. It is used in connection with physical treatments for disabled soldiers. Near the edge of a dial forming the face of the instrument are two parallel sets of graduations, numbered in opposite directions and showing angles up to 150°. Straps are provided for adjusting the device to the limb to be tested and the movement of the latter is shown by an indicator on the dial.



This Instrument, Attached to Arm or Leg, Records Movement of the Joints

CHARGES AND SERVES DRINK AT ONE OPERATION

Beverage carbonator, storage tank, cooler, dispensing faucets, and counter for glasses are combined in a device intended for use where the serving of soft drinks is a side line, or for transient entertainments. It needs no operating power, using the carbonic-gas tank of commerce to supply pressure for dispensing the drink as well as charging it. So long as the gas and beverage supply lasts, the dispensing pressure is automatically maintained at the same moderate point, regardless of the tank content. Lack of excess pressure eliminates the usual spluttering escape of gas from the faucet.



¶According to estimates of the Geological Survey, the quantity of petroleum marketed from oil wells and field-storage tanks in this country in 1918 amounted to 345,500,000 bbl., an apparent gain of three per cent over the former record output, established the previous year.

BOYS AND GIRLS AMID NOVEL SURROUNDINGS

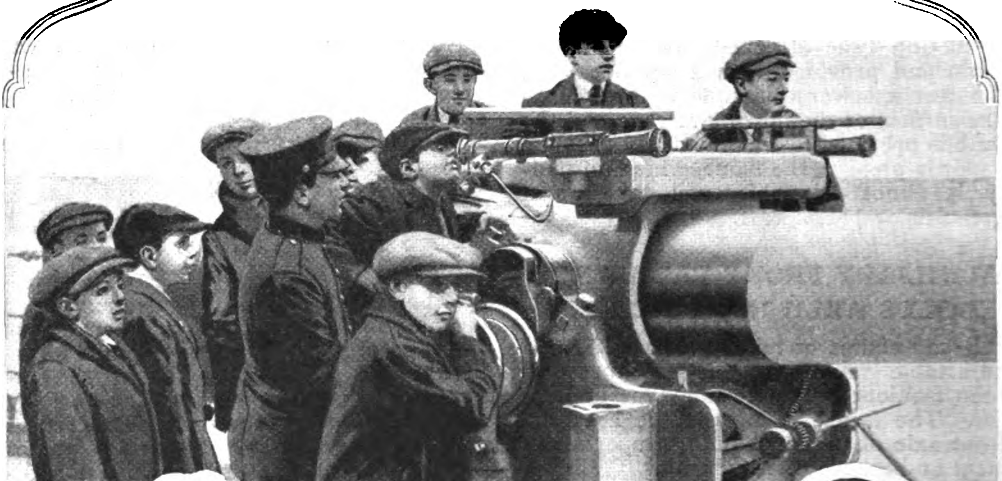
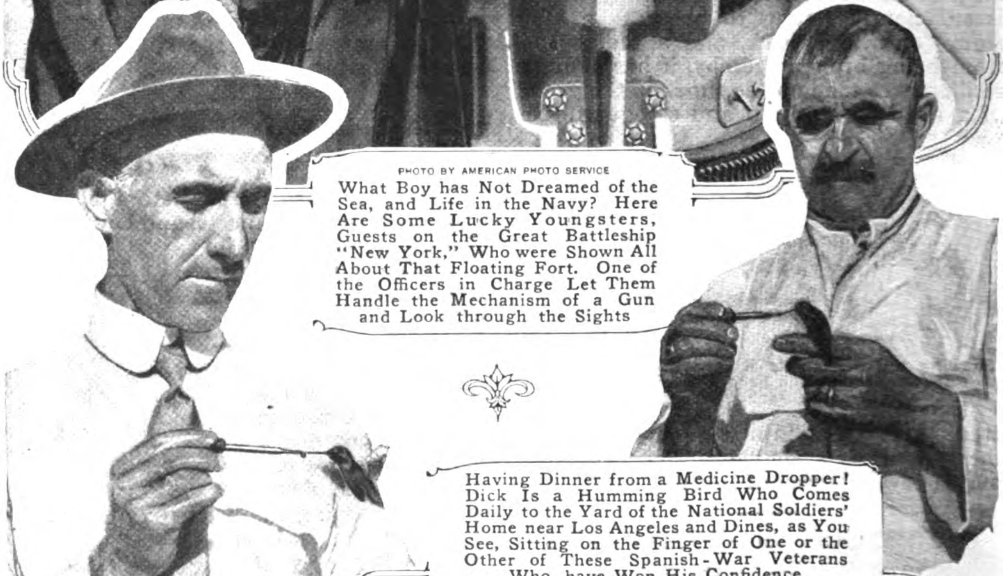
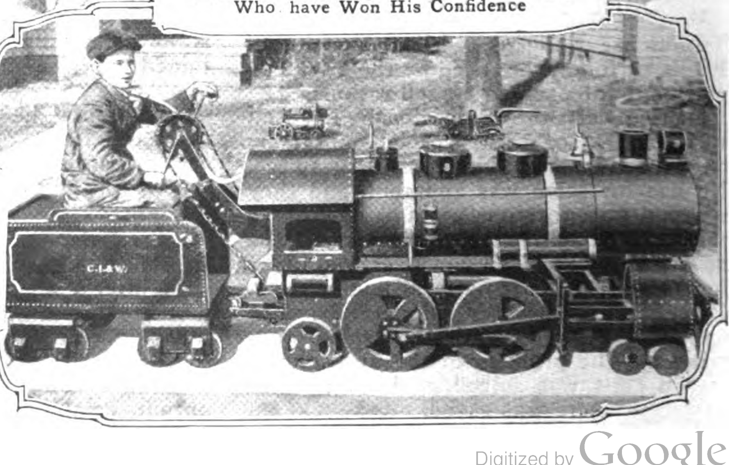


PHOTO BY AMERICAN PHOTO SERVICE

What Boy has Not Dreamed of the Sea, and Life in the Navy? Here Are Some Lucky Youngsters, Guests on the Great Battleship "New York," Who were Shown All About That Floating Fort. One of the Officers in Charge Let Them Handle the Mechanism of a Gun and Look through the Sights

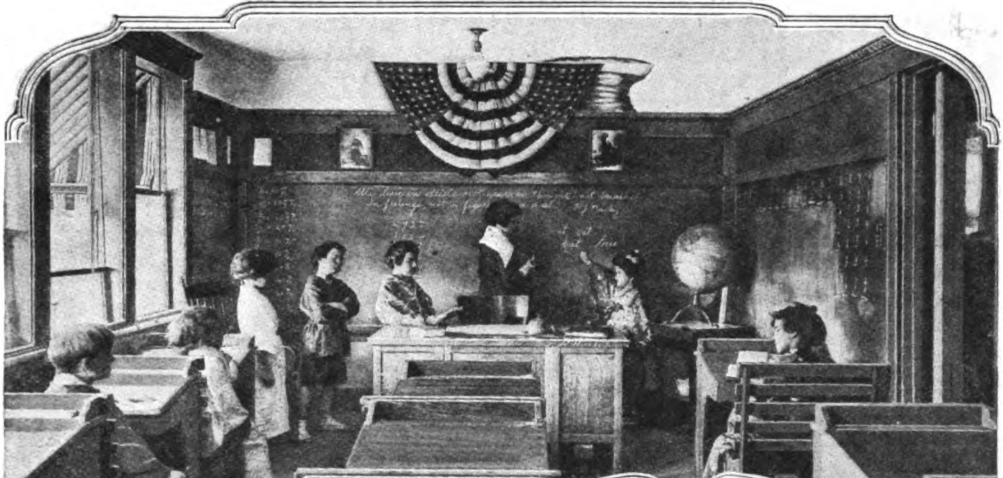


Having Dinner from a Medicine Dropper! Dick Is a Humming Bird Who Comes Daily to the Yard of the National Soldiers' Home near Los Angeles and Dines, as You See, Sitting on the Finger of One or the Other of These Spanish-War Veterans Who have Won His Confidence



A Wonderful Sidewalk Locomotive of Wood and Tin Having All the Parts of a Big Engine: It Is Nine Feet Long and is Propelled and Steered from the Tender. In the Background Are a Tractor and a Separator, Also Homemade

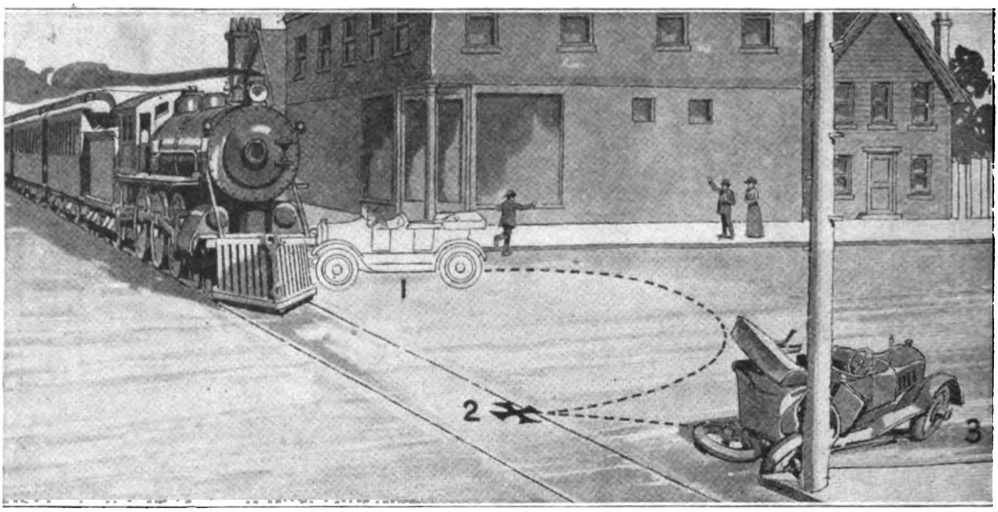
AND THINGS OF SPECIAL INTEREST TO THEM



Perhaps in No Other School in the World can One See Such Strange Sights as Here, with Pupils in All Sorts of Costumes. But That Is Because They Act for the Movies in the Studio Close By and Have to Be Ready at a Moment's Notice. No Doubt They don't Mind a Bit

The Entrance to the Child Actors' Dressing Rooms, Where All the Furniture Is Just the Right Size for the Little Folks: Some of Them are Shown Here in Stage Costumes

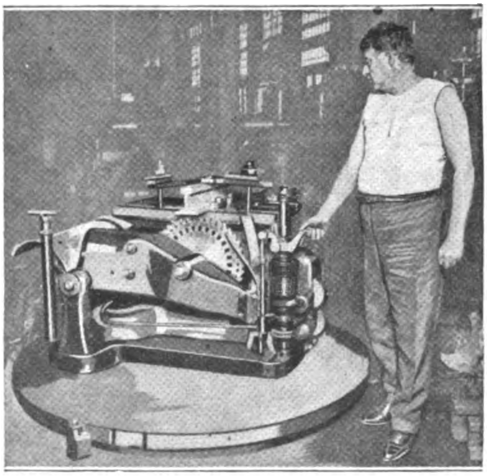
Exterior View of the School Where Several of the Children Whom One Sees in the Movies Learn Their Lessons, Aided by Three Teachers: The Grown-Up Actors Try, as Far as Possible, to Call on Their Little Helpers Only after School Hours



LOOSE BRAKES SEND AUTOMOBILE TO JUNK PILE

WHEN the brakes failed to work and a motor car collided with the slow-moving engine of a passenger train at a grade crossing in a western town some days ago, a scrap heap of broken parts and twisted metal was quickly established. The radiator of the automobile struck the cylinder on the left side of the locomotive. The impact knocked the machine in a semicircular course that terminated on the railway track and resulted in a second collision. The latter was a businesslike one, and the car was hurled against an adjacent telephone pole, thereupon ending its career.

RAIL CUTTER ON TURNTABLE FOR CROWDED SHOP



This Heavy Rail-Cutting Saw is Mounted on a Turntable, Enabling Long Rails to be Cut at Any Angle in a Crowded Shop

Feeding long railroad rails at various angles to a cutting machine in a crowded shop was an exasperating problem until the happy thought occurred of mounting the cutting machine on a turntable. The saw used for this work naturally has a very heavy carriage and demands a rigid mounting. These difficulties, however, were successfully overcome, and the turntable was so arranged that it can be rotated to any position and firmly locked. This enables the long and awkward rails to be handled from any point in the shop and sawed off by turning the cutter to the desired angle.

SAWMILL WASTE MAY BE USED IN SUBSTITUTE CARDBOARD

In England a cardboard substitute has been invented that may prove to have merit. It is made by interposing a layer of sawdust between two sheets of paper and binding the whole together by the use of adhesive material and pressure. Any desired thickness or weight may be obtained by using several alternate layers of sawdust and paper in building the board. In view of the universal paper shortage and the cheapness of sawdust, it is possible that the scheme may prove economical.

¶Plans are now being made for a large exhibition of Norwegian and American mercantile products to be held in the fall of the present year in Norway, the purpose being to strengthen business relations between the two countries represented.

Electroplating Outfit for the Small Shop

By KENNETH M. COGGESHALL

Most of the small metal parts on an automobile body, as well as some parts of the mechanism, have either a brass or nickel finish. It is, therefore, most important that the modern automobile-repair shop include, among its equipment, an electroplating outfit suitable for refinishing these small parts. It is not necessary that such an outfit be elaborate, but it must be adequate; good results cannot be obtained with makeshift apparatus.

The first essential is a suitable plating tank. For the average work, this should be approximately 3 ft. high, 3 ft. wide, and 4 ft. long. It should be made of 2-in. boards, 8 in. or 10 in. wide. Use as few nails or screws in its construction as possible, since the fumes from the plating solution will corrode them. The end boards are here cut 3 ft. 2 in. long, and a sufficient number of them laid side by side, as in Fig. 1, to make the total height of the end piece 3 ft. 6 in. In like manner, the bottom piece is constructed, the dimensions being given in Fig. 2. Fig. 3 shows the dimensions of the sideboards to be 3 ft. 6 in. by 4 ft. 6 in. A groove, 1 in. deep and of the same width as the thickness of the material used, is cut 6 in. from the lower edge and the full length of the end piece, as designated in Fig. 1. It will be necessary to cut three grooves in the sides, as may be seen in Fig. 3. A ⅜-in. hole is bored in the end of each side, 4 in. from the upper edge; a similar hole is bored 3 in. from the lower edge. The tank, when assembled, will appear as in Fig. 4. The bottom is supported by the grooves in the lower part of the ends, while the ends themselves fit into the grooves cut in the sides. Steel rods, ⅜ in. in diameter and threaded at the ends, are passed through the holes from one side to the other. Steel washers are placed next to the wood, and nuts screwed on, thus holding all pieces tightly in place.

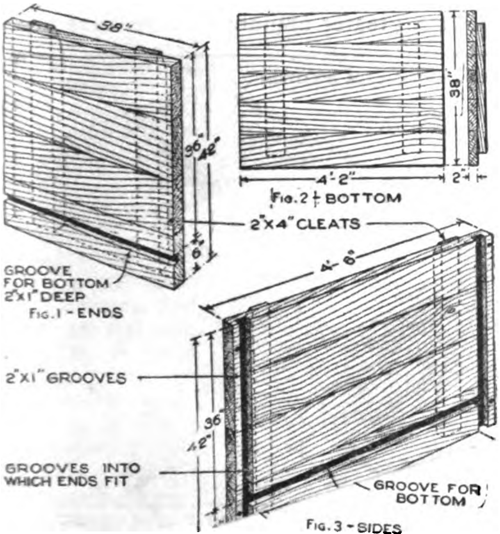


Fig. 1 - Ends

Fig. 2 - Bottom

Fig. 3 - Sides

The [illegible] and Bottom of the Tank are [illegible] Each Other and Joined with Metal Fastenings to Provide Greater Strength

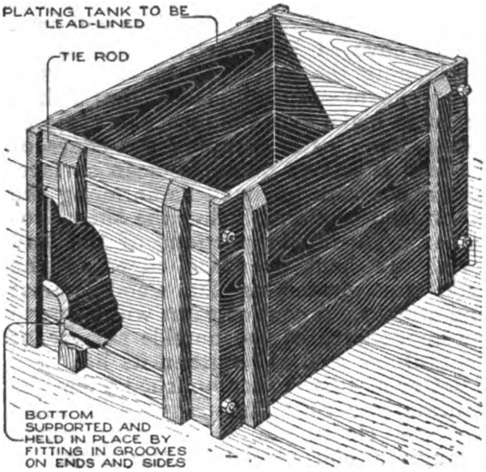

PLATING TANK TO BE LEAD-LINED
TIE ROD
BOTTOM SUPPORTED AND HELD IN PLACE BY FITTING IN GROOVES ON ENDS AND SIDES

Fig. 4

The Tank is Fastened Together by Steel Tie-Rods Which Are Not in Direct Contact with the Plating Solution

To cover the inside and bottom of the tank, secure several thin sheets of lead, of suitable size; if possible, use one sheet to cover the bottom and two opposite sides, thereby saving the labor of closing two joints. The remaining sides will have to be covered separately, these sheets overlapping the first by 1 in. Following along the overlapped places, tap with a mallet to make sure the pieces lie close to each other. After scraping the edges of the lead sheets to obtain a clean surface, pass a hot iron or small flame along the overlapped sections, fusing the sheets together. The upper portions of the lead sheets are bent over the edges of the tank, thus protecting the wood against acid attacks. A coat of paint will improve the appearance of the outside surface of the tank, as well as lengthen its life.

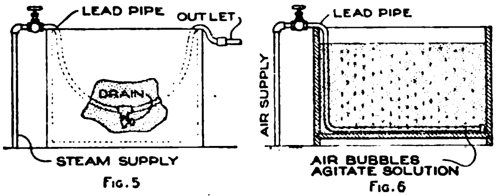


Fig. 5 Fig. 6

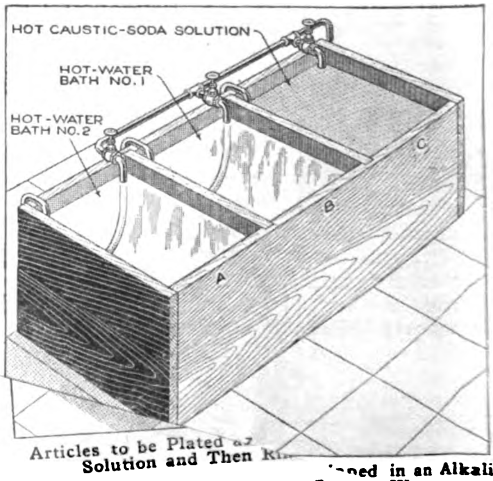
The Electrolyte is Heated by Steam in a U-Shaped Pipe and is Kept Agitated by Bubbles of Compressed Air

Better plating is accomplished when the solution is warm. The best plan for heating the electrolyte is to pass steam through a coil placed in the tank. A steam connection is available in most shops of average size, and it therefore only remains to install the heating coil. For a tank of the size here described, 8 ft. of ¾-in. lead pipe, formed into a large "U," as in Fig. 5, and mounted inside the tank, is all that is necessary. A valve placed at the intake for the regulation of the steam flow, and an outlet for the other end of the coil, will be required. A drain cock should be placed at the bottom of the "U," so the pipe may be drained when the tank is being cleaned. Heating the solution by steam is not necessary during the summer months, but in cold weather it is most essential.

The method of agitating the electrolyte is quite simple. As shown in Fig. 6, 8 ft. of ¾-in. lead pipe is passed over the upper edge of the tank and down to the bottom, where it is laid the full length of the tank. Previous to laying the pipe, that portion which will lie in the bottom of the tank should have a number of very small holes drilled in it. The bottom end of the pipe is closed with a cap. After the pipe is in place and the solution in the tank, it is only necessary to connect the former with the compressed-air supply; the air passing from the holes and up through the electrolyte will keep the latter constantly agitated. Compressed air from the "free-air" tank will be handy for this purpose in automobile-repair shops. While agitation of the solution is not absolutely necessary, it will improve the quality of the plating.

For the source of electrical energy for plating, it is best to secure a generator designed for this particular work. Direct current of large amperage is required, under a low pressure, usually about six volts. The generator may be driven by a gasoline engine, or an electric motor connected to the service lines. The generating outfit should be situated near the plating room, so that the voltage drop in the feed wires will be small. A rheostat connected in the field of the generator will allow the operator to regulate the plating current to the necessary value.

For nickelplating, the electrolyte is prepared in the proportion of ¾ lb. nickel ammonium sulphate to 1 gal. of water, with a very small amount of boric acid added. A good solution for copperplating may be made by dissolving in each gallon of water used 10 oz. of potassium cyanide (which is a deadly poison), 5 oz. of copper carbonate, and 2 oz. of potassium carbonate. Brassplating may be accomplished by adding zinc carbonate; a good yellow brass color results from a solution of two parts copper to one of zinc. A strong electric current will deposit a greater amount of zinc, thus producing a lighter color. In each the proper anodes, or blocks of the



Articles to be Plated a[illegible]ned in an Alkali Solution and Then Ri[illegible] Water

to be deposited, must be provided; a copper anode, for instance, for copper-plating. The anode is connected to the positive wire from the generator, while the object to be plated is connected to the negative line. A convenient method of connection is to place copper bars across the tank, insulating them from the lead sheeting by wooden strips. If three bars are available, the two outside ones, near the ends of the tank, should be connected to the positive terminal of the generator, and the metal anodes suspended in the solution from them by copper wires. The central bar should be connected to the negative line and the objects to be plated supported in the electrolyte by wires connected to it.

Before a piece is put in the plating bath, it must be chemically clean. It is not sufficient to remove the grease or tarnish by mechanical means; the part must be dipped in a hot chemical solution. It must not be touched with the fingers after dipping prior to plating if perfect work is desired, since the smallest trace of oil will spoil the plating surface. Aside from the preparation of the metal parts for plating, this "bright dipping" may sometimes be used alone to restore the original luster to tarnished parts. Metal parts, especially brass, that have been cleaned and brightened by dipping, and then coated with a clear lacquer, will hold their luster for months under favorable weather conditions.

The only equipment necessary for dipping work is three tanks, or one tank with three compartments, as in Fig. 7. These tanks are built of wood and lined with sheet lead to prevent leaking. A heating coil similar to that used for the plating tank, Fig. 5, should be installed in each compartment. Tanks A and B, Fig. 7, are filled with water kept hot by the steam coils. Tank C is filled with a solution of 1 lb. of caustic soda to each gallon of water used. The solution may be retained indefinitely by merely adding caustic soda from time to time to keep up its strength. The water in the rinsing tanks A and B must, of course, be changed occasionally, and it may be found best, if the amount of dipping warrants it, to equip them with overflow pipes and allow fresh water to flow into them from an outside water connection. Pieces to be dipped are held for a moment in solution C, then rinsed in B, and finally in A. To dry the pieces, put them in a box of sawdust; the latter will quickly absorb the moisture.

For most shopwork, the caustic-soda solution will suffice, but for a better quality of work, it is well to use an acid bath in conjunction with it. A large earthenware jar, placed in a tank of cold water, as in Fig. 8, will hold the solution. The acid should be prepared in the following proportion and order: one part water, four parts nitric acid, and six parts sulphuric acid. This bath is particularly helpful in cleaning cast-iron, steel, and aluminum parts. In each instance it is best to dip the metal first in the caustic-soda solution, then in the acid bath, and rinse thoroughly before plating.

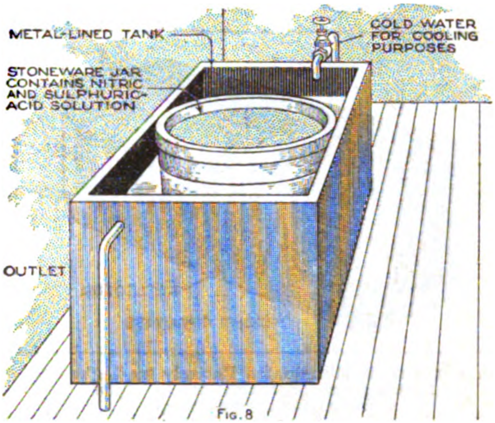

METAL-LINED TANK
COLD WATER FOR COOLING PURPOSES
STONEWARE JAR CONTAINS NITRIC AND SULPHURIC ACID SOLUTION
OUTLET

Fig. 8

An Acid Bath before Plating, in Addition to the Caustic-Soda Dipping, Improves the Quality of the Plating

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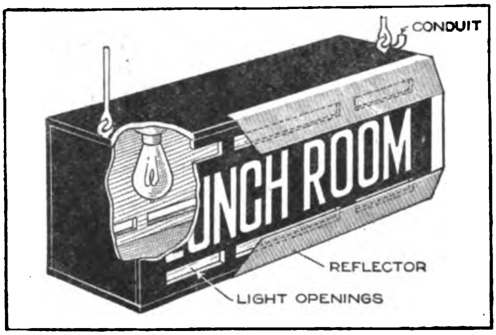
Removing Plant Growth from Stone

Almost all stonework outdoors becomes badly marked with plant growth after a while. This vegetation is composed of minute organisms that cannot be seen at all, except when they are present in large numbers. To get rid of these, proceed in the following manner: Scrape the stone well with an old knife, removing the dirt as far as possible in this way. Still, there will be much remaining that cannot be reached. Prepare a one-per-cent solution of carbolic acid and water. Wash the surface of the stone with this, and leave it wet for a few hours. Then, by scrubbing with a stiff brush, it is easy to get away every tiny plant. To prevent the return of vegetation, and also to improve the appearance of the stone, treatment with salt is strongly recommended. Mix up a strong solution of salt and water and use this for washing the stone. It will bleach the stone, and, when the latter is dry, it glistens attractively.

Light Illuminates Sign by Transmission and Reflection

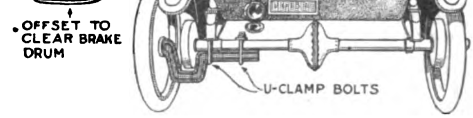
An electric sign with transparent letters is very costly. A flood-light effect is as efficient, and it is easier to produce a sign lighted in this way in the home workshop. A box is made for the sign, considerably larger than the lettering calls for, and deep enough to house the lights. Around the edges of the box, on the face side, long narrow slits are cut. The inside of the box is painted white, and the outside black with white letters. Around the edges of the box, strips of tin are nailed, and bent at right angles to the face of the sign. The inside of these strips are painted white, and the outside black. Lamp sockets and lamps are installed in the box, and the sign hung in place and wired. When the current is turned on, the lettering will be illuminated by light reflected through the slits, to the tin, and then upon the face of the sign.



A Sign That is Illuminated Entirely by Light Reflected from the Inside can be Made in the Home Workshop

Emergency Wheel for Disabled Automobiles

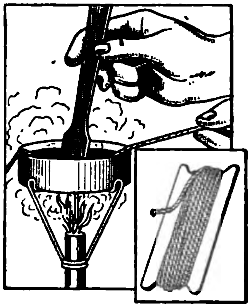
For the garageman who encounters road jobs that necessitate towing in a car with a broken wheel or axle, an emergency wheel, such as is used by one suburban repair shop, is not only adaptable to most any kind of car, electric, gasoline, or steam, but is quickly made up of discarded materials with but little work.



An Emergency Wheel, Mounted on a Special Axle, can be Readily Attached to the Disabled Car

The wheel is of the regular automobile type with a 34 by 4-in. pneumatic tire, this size being suitable for use on both large and small cars. The axle is either a broken front axle or a short section of a strong steel beam. The emergency axle is bent or dropped, the offset being necessary to clear the axle-housing flange or brake drum. The device is attached by means of two U-shaped clamps and nuts. The sketch shows the general appearance and manner of attaching the emergency wheel to the rear axle of a car, but it may also be used in front, as the clamps are easily shifted.

Test Taper for Ammonia Leaks



The following method for making a sulphur taper to use in testing for ammonia leaks is very convenient. Melt a small quantity of sulphur in a shallow pan (the lid of a baking-powder box will do) and, with a notched stick, hold a heavy cord down into the pan, and draw it through, thus coating the cord with melted sulphur. This should be kept very hot, otherwise it thickens and coats the cord heavily, causing too much of a flame when the taper is used. Wind the dipped cord on a piece of cardboard, about 6 in. long, being careful not to break the sulphur coating. This cord, when cut at the turns, forms sticks of convenient length to hold while using. To test for ammonia leaks, light a sulphur taper and hold the flame near the suspected place. Whenever there is a leak, a dense white smoke will appear; even a leak too small to give off an odor will cause a smoke.—F. H. Sweet, Waynesboro, Va.

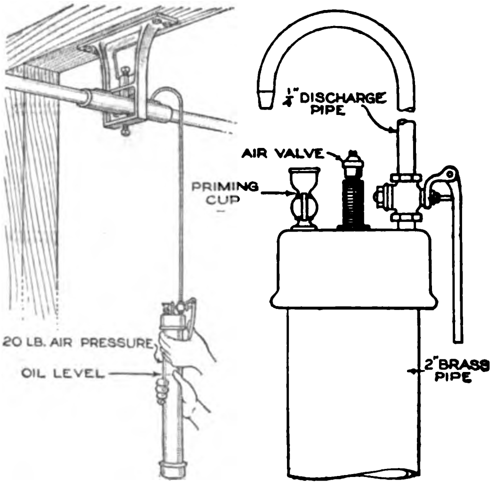
Soapstone Extinguishes Gasoline Fire

A gasoline fire in a vulcanizing plant, which might otherwise have become disastrous, was quickly extinguished by one of the workmen. He seized a sack containing four or five pounds of soapstone, and sifted it heavily over the rubber tire which was being washed with the gasoline when it caught fire. By this means, the flames were soon smothered.—Claude O. Soats, North Salem, Ind.

Oiling Overhead Shafts without a Ladder

A homemade contrivance has been used with considerable success in oiling the shaft bearings of a large shop. It saves time and does away with the trouble of carrying, or moving about, a long ladder, and eliminates the danger of the workman falling off a ladder or getting caught in the overhead pulleys.

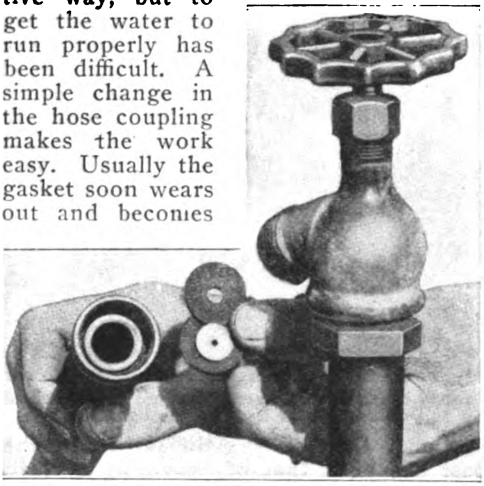
The main cylinder of the device is made of a length of 2-in. pipe, and two pipe caps. Brass makes the lightest and best-appearing tool, but iron is as good otherwise. There is a charging cock, such as a priming cup, a spring-closing discharge valve, and an air valve connected to the top cap. A long piece of ¼-in. pipe, one end of which is bent to the form shown, is used to convey the oil to the shaft bearing. This tube must reach nearly to the bottom of the cylinder. This is the operation: The cylinder is filled two-thirds full of oil, and then the shop compressed-air line is used to charge the remaining volume of the cylinder to 20-lb. pressure. By pressing gently on the spring cock, the oil is forced up the pipe to fill the bearing cup or trough. After a little practice, the work of oiling with quickness and precision is learned.—C. H. Willey, Concord, New Hampshire.



A Specially Constructed Shaft Oiler Which Forces Oil into the Bearings by Air Pressure, Saving Time in a Large Shop

Hose Attachment Permits Slow Irrigation

Irrigating a garden slowly and continuously has been found the most effective way, but to get the water to run properly has been difficult. A simple change in the hose coupling makes the work easy. Usually the gasket soon wears out and becomes leaky, and thus the water pressure varies. The attachment will prevent this trouble. It consists merely of a thick copper washer with a ⅟16-in. hole, and two ordinary rubber washers, one to be fitted over and one under the copper washer in the coupling. When the hose is attached to the hydrant, with the joint screwed tight, the rubber washers prevent leakage and hold the copper washer in place. The faucet may then be fully opened, without throwing the pressure into the hose.



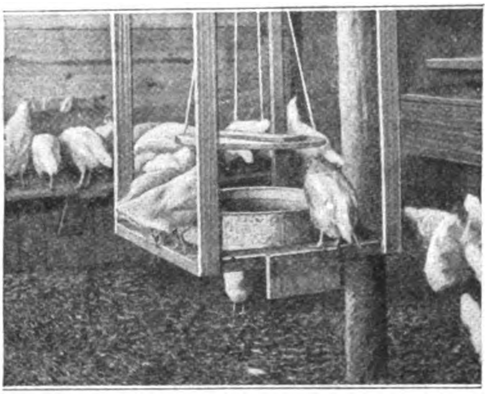
A Copper Washer between Rubber Gaskets in a Hose Coupling Provides a Steady Stream for Garden Irrigation

The water is distributed under low pressure by means of a piece, 10 ft. long or more, of ⅜-in. pipe, pierced every 24 in. with a ⅟16-in. hole. The pipe is fitted at one end with a reducer and coupling to fit the hose, and is capped solid at the other. The streams that come from the pipe are uniform at all the holes, and not of sufficient strength to cause erosion of the soil. The pipe may easily be moved while the water is running.

It is possible to use this irrigator in many ways. After transplanting, place the pipe between the rows, and let the water run until the ground is thoroughly soaked. During a dry spell, use the pipe between the rows, and also around the patch, at both the sides and ends of the rows. This should be done only after the heat of the day, however. It will keep the plants from wilting the following day. —John L. Von Blon, Los Angeles, Calif.

Poultry Drinking-Water Protector

With poultry raising becoming ever more important, the aids to profitable production are attracting increased attention. One of the difficulties in the past has been that of providing a clean and dependable water supply in the poultry houses, common pans being quickly overturned, and special water jars befouled with litter by the scratching hens. With the protection here illustrated, there can be no overturning or soiling of the water. The receptacle is a galvanized pan suspended from the ceiling by means of four sticks, making a sort of shelf at an easy jumping distance from the floor. The hens stand on the shelf to drink, and are prevented from dabbling with or soiling the water by a circular board suspended above the pan, which interferes with the hen alighting on the pan edge, but does not hinder her drinking. Thus, at all times, the water supply is clean and cannot be overturned.—Alvah H. Pulver, Sodus, N. Y.



Poultry can Neither Scratch Dirt into the Protected Drinking Water Nor Tip the Pan Over

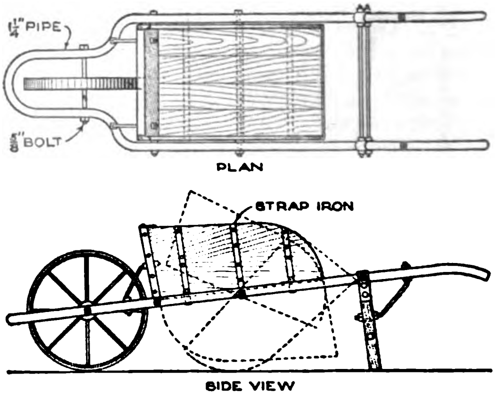
Ink Made from Old Indelible-Pencil Stubs

An excellent grade of indelible rubber-stamp ink is obtainable without cost by collecting the stubs of indelible pencils that accumulate about the office, splitting them, and dissolving the leads in water, in an ordinary ink bottle. The thickness of the ink, or the density of the deep-purple color, depends on the amount of lead in proportion to the water in which it is dissolved. For inking pads and rubber stamps of the self-inking type, the ink produced in this manner should be fairly thick—about the consistency of average coffee cream. For use in brushes for addressing packages, freight shipments, etc., the ink must be slightly thinner. By thinning to the desired degree, a splendid indelible writing fluid may be had for use in pens.

In view of the fact that an average grade of rubber-stamp ink now retails at $20 a gallon, business firms, making use of any number of indelible pencils, will find it quite profitable to have a receptacle about the office for collecting stubs to be later turned into stamping ink and writing fluid.—John Edwin Hogg, Alhambra, California.

A Convertible Wheelbarrow

Two faults of the ordinary wheelbarrow may be avoided by building a new type, with these two points in mind. The wheelbarrow, as a rule, is extremely awkward to dump a load from, and, in the garden type, has removable sides which are usually left in some out-of-the-way place by the gardener. A stout wheelbarrow can be made with combined frame and handles of galvanized pipe, using a heavy bolt for the axle of the iron wheel. The front of the body is braced firmly to the frame, while the bottom and sides are fastened together, and revolve on a bolt axle. This arrangement allows the load to be dumped very quickly, and also permits the barrow to be used bottom up, when no sides are needed. The body is held firmly in place when used in the normal position, by resting against the front board, which is set at an angle, and by two buttons on the front board. When inverted, two hooks on the front board fit into two screw eyes on the bottom. The legs may be either of wood or pipe, firmly braced.—Charles Black, Jr., Hightstown, N. J.



A Wheelbarrow with the Body on an Axle is Easily Dumped, and Quickly Converted to the Platform Type

The Warping of Wood

By CHARLES A. KING

BY making use of the conditions which produce changes in wood, it is theoretically possible to prevent entirely the warping of building lumber. It would be neither practicable nor desirable to apply the controlling methods upon a commercial basis, as the ordinary warp and twist can be eliminated while the lumber is being worked. However, there will be instances where special boards will need to be treated, to remedy or control their natural tendency to warp.

Nearly every kind of wood is greatly affected by moisture, which the fiber absorbs. As the wood becomes filled with water the board expands or becomes wider. The effect of heat is to draw this water out until the fiber contains the same degree of moisture as that in the air surrounding it; this causes the board to become narrower again. Thus, moisture reaching one side of the board only, will cause this side to swell or become wider, while the other side shrinks or remains the same, being in drier air; this swelling of one side of the board and shrinking of the other causing it to assume a curved form, or to "warp."

The effect of these conditions upon the length of a board is so slight that it is rarely considered. Their effect on the flat surface may be demonstrated by laying a board upon the ground where the sun will strike it. Soon the board is resting upon its middle. By turning it over, the same conditions acting on the other side will remedy their own effects.

No wood was ever so well seasoned that it would not be affected to some extent if exposed to trying conditions. Some are affected more than others, depending upon the nature of the wood, the part of the tree from which it was cut, its previous seasoning, the relation of the annual rings to the surfaces of the board, and upon which side the heat or moisture is the greater.

Some kinds of wood warp, or change form, more than others under the same conditions, which fact largely governs the selection of woods for different purposes. The pines, cedars, and other coniferous woods are less likely to change form under adverse conditions than the wood of deciduous trees; spruce is an exception to this rule, being one of the worst woods known to warp. Gum wood, sycamore, basswood, and whitewood, or poplar, are the deciduous woods which are most likely to cause trouble.

There are different ways of controlling the tendency to warp and of minimizing its effects, but the usual method is to cleat, or fasten securely, wood which is likely to warp. Upon the best class of work careful selection of wood is made, to see that it is suitable for the purpose in view, and to ascertain its relation to the annual rings of the tree from which it was cut, or whether it was plain or quarter-sawed. A board cut from a log as at A, Fig. 1, in which the surface of the board is tangential to the direction of the annual rings, will be almost sure to warp. One sawed as at B, with the annual rings at nearly right angles with its surface, will not warp under ordinary conditions.

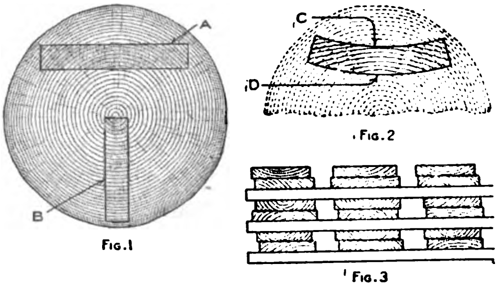


Fig. 1 Fig. 2 Fig. 3

The Relation of the Surfaces of a Board to the Annual Rings of the Log Determines the Extent of Warping

The tendency of a board in shrinking is to straighten its annual rings, as indicated in Fig. 2, which will cause the outside of the board to become hollow or concave, as at C, and the inside to become rounding, as at D. The terms "outside" and "inside" allude to the relation of the board to the outside of the tree and the pith, and may be discovered by looking at its end and noting the direction of the curve of the annual rings; the side of the board tangent to the rounding side of the annual rings will be the outside, and the side which grew nearer the center of the tree will be the inside. These terms apply only to the slash, bastard, or plain-sawed boards, shown at A; it is plain that the edges of a quarter-sawed board, as at B, will form its inside and outside.

The tendency of a board to warp may be minimized by placing it with its outside to the moisture or the cooler air, which will tend to make that side wider, or to minimize its shrinking, and the inside to the dry or warm air, which will modify its natural reluctance to shrink. Warm air applied to the outside will cause the board to warp more than if applied to the inside; often, for this reason, boards are piled in double courses with their outsides together, as in Fig. 3, which prevents the dampness from evaporating too rapidly through the pores of that side, and resists the tendency of the boards to warp. It is plain that if the inside of each board is exposed to the air, it will dry out faster than the outside, thus reversing the natural tendency of the board to become rounding upon the inside.

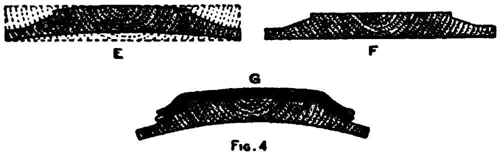


Fig. 4

When Curved Boards are Needed, Advantage may be Taken of the Tendency to Expand When Moistened

The top and bottom courses of a lumber pile are likely to warp as the air strikes one side more freely than the other. For this reason, boards upon the top of a pile should be turned over occasionally; especially must wide kiln-dried boards be cared for or they will warp badly. The bottom boards should be treated the same way, but the effect of the air striking one side of these will not be so injurious as in the top course, and being at the bottom of the pile, it would not be expedient to turn the entire pile over, though if expensive lumber is being cared for, it should be repiled every few months, which will do much to prevent extreme warping.

In some places, it is the custom to stand wide boards upon one edge or end in such a way that there will be free circulation of air around them, which is the most favorable condition to keep kiln-dried boards from warping. Probably green boards would warp somewhat, even if they were piled in this way. Until green boards have become quite well dried, they should be kept in a pile under pressure of the weight of the boards above them.

There is no process which will prevent wood from shrinking if it is exposed to trying conditions, though warping may be minimized by impregnating the wood with chemicals which repel moisture. The steaming of wood has a beneficial effect upon it. Lumber thus treated is not affected to the same extent as that dried by ordinary methods. Wood which is to be used for any purpose in which its grain or color are important considerations, should not be treated chemically, as its appearance will be injured, and it cannot be finished satisfactorily. Certain chemical treatments make wood practically waterproof, insect-proof, and slow-burning, besides practically destroying the tendency to warp, but they leave the wood badly discolored.

If a board has become warped, it may be straightened by applying, as a remedy, the same condition which caused the defect; in other words, by applying moisture by means of wet sawdust or a folded cloth to the hollowing side, or placing the rounding side to steam pipes or other heat, or by both. A board laid, hollowing side down, upon a bed of moistened sawdust or folded cloth, or upon a cold or damp surface to prevent contact with warm dry air, can be made to resume its original form. When the board has straightened, or, if anything, warped a little the other way (for it will tend to straighten itself while drying), the sawdust or cloth may be removed and the board dried.

The principle involved in making a warped board straight may be applied in making a straight board curved; for instance, in making the panels for curved panel work fit the curve of the rails. It would be difficult to mold the face of a panel, which had been made to a given curve, by cutting the wood away, as at E, Fig. 4. After molding the panel while it is straight, as at F, the wet sawdust or cloth should be placed upon the side which is to be rounded, as at G; the other side being tried frequently by a pattern slightly more curved than the panel is to be, since it will straighten somewhat in drying. The moisture is removed when the desired form has been reached.

Crossing the grain and gluing pieces of wood together, as at H, Fig. 5, will not hold the pieces in shape if they start to shrink, and the boards will wind, as at J. If fastened together with screws or nails without glue, which will allow each piece to shrink and swell a little, there will probably be no trouble with warping. If the desired thickness is built up in three or more layers of well seasoned wood, with the grain of adjacent layers crossed as in Fig. 6, the board will usually hold its shape unless exposed to so much dampness or heat that the glue is affected and the layers separate. Wide boards built up of veneers are an extension of this method of making boards hold their shape.

Usually, splitting a board in narrow strips and turning alternate strips end for end, then gluing, as in Fig. 7, will make it hold shape under conditions which are not bad enough to soften the glue; drawing boards made by this method are satisfactory. Such a board, surfaced and veneered, is an example of the common method of gluing a wide board where the best results are desired, and where building up in layers is not practicable. The cores of high-quality veneered doors are glued up by this method. A board veneered upon one side only will be almost sure to warp unless it is fastened to hold it in shape.

The method of preventing the warp of a board by scarfing, illustrated in Fig. 8, is not desirable. It weakens the board and is not highly efficient; the same method is applied in bending wood either in width or length, as in a circling stair riser. The board will still warp in the thickness from T to U, and if the edges are fastened, the shrinking of the board will make it split along the line of one or more of the saw cuts.

Owing to the tendency of all wood to shrink in a direction parallel to the annual rings, quarter-sawed oak shrinks proportionately more in thickness than it does in width, but its tendency to warp is slight, compared with a plain-sawed board.

It is trying to the patience to discover that a panel in a piece of furniture or wainscoting has become warped, and cannot be straightened without tearing it out. Often this is caused by its being finished upon one side only, and may be remedied or prevented by giving the back side of the panel work a coat of paint. This will prevent the air from affecting the pores of the back more than it does the face side, which is protected by the finish.

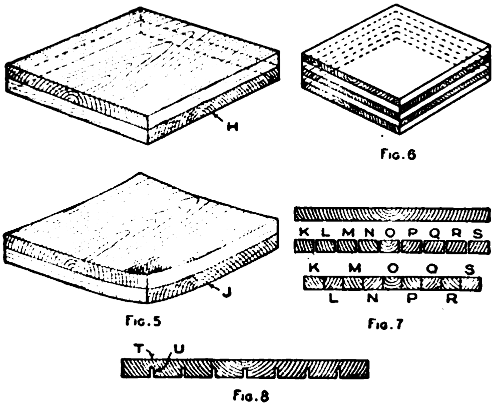


Fig. 6

Fig. 5

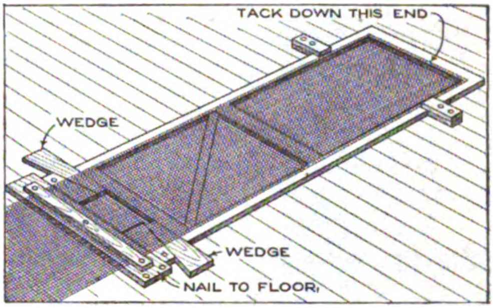
Fig. 7

Fig. 8

Crossing the Grain, Veneering, and Scarfing Are Methods Used to Prevent Warping, All Being Successful under Reasonably Favorable Conditions

Renewing Wire Screening on Old Screen Door

Among the jobs that fall to the average householder, stretching new screen on old door frames, as fly time approaches, is far from being the least bothersome. A method that has worked well is shown in the accompanying sketch. The screening is tacked securely along either the top or bottom of the door, which is then laid flat on the floor, or workbench. A strip is nailed to the floor or table, and wedges are placed in the position shown between the door and strip. After stretching the screen as much as possible by hand, it is held in place by nailing another strip on top of the first to clamp the wire. Next, drive the wedges in toward each other until the proper tension on the screen is secured, then tack all edges of the wire to the door frame and put on the moldings. If the door shows a tendency to rise off the floor under the tension of the wire, use guide clamps as shown, but these will seldom be found necessary.—Warren Ichler, Decatur, Ill.



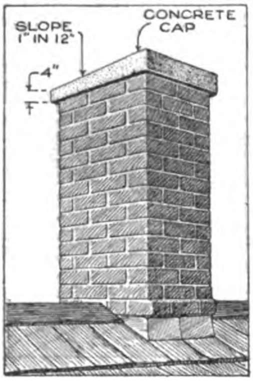
The Use of Simple Wedges and Clamps Aids in Renewing the Wire on an Old Screen Door

Attachment Plug Used as Fuse Plug

An electrical experimenter who found the expense of replacing blown-out fuses to be increasing badly, owing to high prices of fuse plugs, decided to use an attachment plug, with a piece of fuse wire connected to the screws, in place of the cord leading to the lamp. Such fuses are readily repaired by connecting in a new piece of fuse wire.—Howard D. Wildman, Schenectady, N. Y.

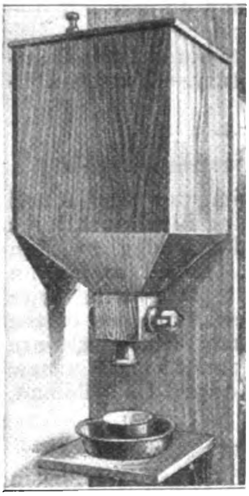
¶Keep an ordinary rubber washbasin plug handy. It is useful in case the threaded plug of the grease trap on the basin is rusted, mislaid, or broken.

Chimney Cap of Concrete



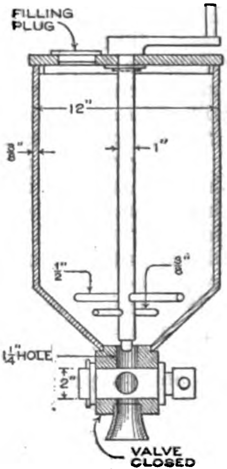
The life of many a chimney would be greatly lengthened if a concrete cap was made for it when built. The cap holds the chimney in alinement, prevents the top bricks from becoming loose, acts as a watershed, and the chimney looks much neater than if no cap is used. Such a cap will add years to the life of an old chimney, but any loose bricks at the top of the chimney must be carefully cleaned and set in fresh mortar before the concrete is put on. The concrete cap should project 1 in. beyond the brick on all sides of the chimney. On the top it slants, with a fall of 1 in. to the foot, the concrete being 4 in. thick at the thinner edge. The cap should be made by tamping a rather dry mixture—1 part cement, and 4 parts sand—into a form made the proper size for the chimney. When dry it is set on the brick with ordinary mortar.

A Timesaving Sugar Bin



The objection to most sugar bins and boxes is that when the sugar gets lumpy, it will not flow out freely. The photograph shows a bin which will save a great deal of time by providing a free and regular flow of sugar from the bin to the cooking vessel or sugar bowl. Particularly is such a bin useful when a certain weight of sugar is to be added to a mixture for cooking, as is often done by the more modern cooks. The vessel can be set on the scale directly under the bin, and the sugar turned on like water at a faucet. The flow can be made rapid at first, then slow as the required amount is nearly reached.

The main body of the box is made of ⅜-in. hard wood, joined together with nails through corner blocks. The joint can be strengthened at the corners by gluing over it, on the inside, a piece of heavy canvas. At the lower end of the bin is a hopper bottom, in which is inserted a block, cut from 4 by 4-in. wood. This block is dressed down to the shape indicated, the upper part being fitted in between the four sides of the hopper bottom, and nailed into place. There are two large holes through this block, the vertical one being 1¼ in. in diameter, and extending straight through the block from top to bottom. In the bottom of this is set a spout, out of which the sugar flows into the vessel below it. A horizontal hole, 2 in. in diameter, should intersect the vertical hole, the center of one passing through the center of the other, as closely as possible. The horizontal hole is to take the valve, made of 2-in. round wood, which is shown in the detail. This valve has a 1¼-in. hole bored through it, in such a position that when turned so that this hole is vertical, it forms with the vertical hole through the block a continuous downward passage for the sugar. When the valve is turned at right angles to this position, the flow of the sugar is stopped. A handle is provided at the end of this rotating valve, and it is important that the hole for this handle should be bored exactly parallel with the large hole through the valve.



The mechanism for breaking up the lumps in the sugar consists of a piece of 1-in. round wood, which should be clear and strong, extending downward through the middle of the bin, with a crank at its upper end, and two or more pieces of dowel stock set through it in the space inclosed by the hopper bottom. This vertical shaft rests very loosely in the hole through the large block at the bottom, but the hole forms a sufficient lower bearing, even though the shaft is loose enough in it so that the sugar will flow out around the lower end of the shaft. The round pins for breaking up the sugar lumps should be of about the proportions suggested in the sketch. The crank at the top of the shaft should have plenty of strength, but if made of hard wood, it need not be larger than suggested in the sketch and in the photograph.

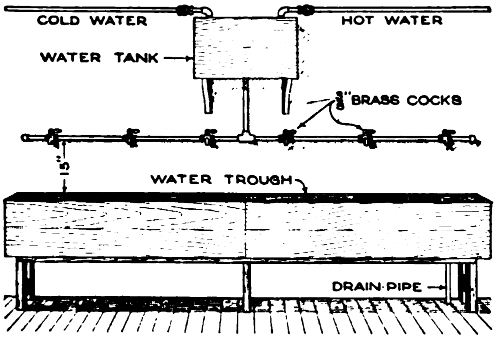
For filling the bin with sugar, a hole may be provided in the top, with a plug, as shown in the sketch. This is not really necessary, however, as the whole top of the bin lifts off quite easily, and the bin should be made large enough so that it will not have to be filled oftener than once or twice a month.

Repairing Leaks in Galvanized Vessels

An inexpensive, practical way of repairing leaky galvanized pails, tanks, tubs, or other receptacles, is to place approximately ½ in. of building cement in the bottom of the article to be repaired, and mix with water to the consistency of thick paint. This mixture fills all the cavities, leaving, when dry, a waterproof, durable repair. Of course this adds some weight to the article mended.—Ed. Haberlein, Jr., McPherson, Kan.

Sanitary Individual Water Faucets

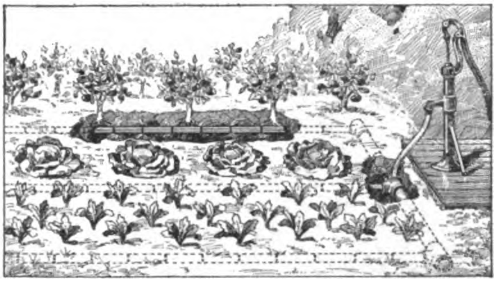
In a factory where a number of men wash at the same time, the washbowls become dirty and unsanitary very quickly. The inexpensive system described provides a faucet for each man, insuring clean water for him. Cold and hot water are supplied to each faucet from a tank into which the mains empty. A trough with a drain carries off the dirty water. —Roy H. Poston, St. Francois, Mo.



Individual Faucets in a Factory Wash Room Provide Clean Water for Each Employe

A Simple Irrigating System for the Home Garden

By using some form of irrigating system, a small piece of ground will produce a marketable crop at a time when prices are high because of the supply being short. The system described is not designed for a large area. Near a source of water pressure, such as a hydraulic ram, windmill, or hydrant, a line of 6-in. glazed tile, with T-connections every 6 ft., is laid 1 ft. below the surface. From each connection are laid parallel lines of 3-in. unglazed tile. The joints of the glazed tile are cemented, but the unglazed tiles are merely placed end to end, allowing the water to percolate into the soil more rapidly than it would by merely soaking through the tile. The fall need not be more than 1 in. in every yard. When the trenches have been filled in, the system is ready to use, water being supplied by a pump, or hose from the hydrant to the glazed tile. A tomato patch, 20 by 30 ft., with the plants set 3 ft. apart each way, and irrigated for a few minutes night and morning by three lines of tile, will produce a crop which will more than pay for the tile and labor in one season.



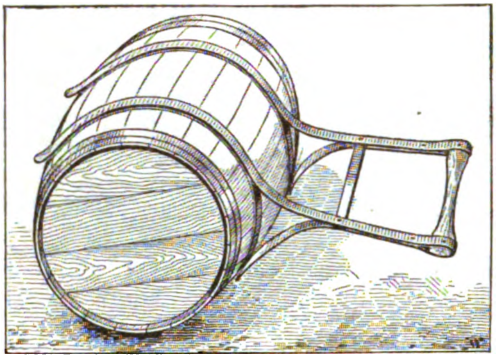
Water Pumped into the Tile Once a Day during Dry Weather Insures Sufficient Moisture

To Keep the Reins from Catching on the Wagon Pole

An old ax helve, or similar piece of wood, cut to a length of 15 in. and wired to the end of the wagon pole with a loop of wire through a hole drilled in one end of the stick, will keep the lines from getting caught under the pole. The stick hangs from the end of the pole, making it almost impossible for the reins to catch, no matter how low they fall. The neck yoke can be put on by slipping it over the stick first.—J. E. McCormack, Haliburton, Ont., Can.

A Handle for Rolling Barrels

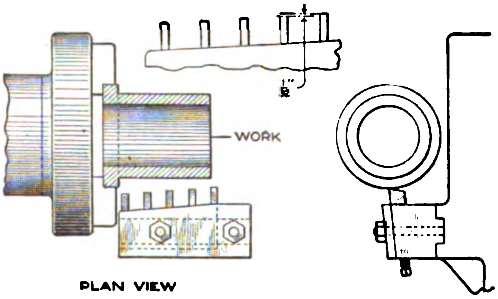
The difficulty in handling barrels usually arises in the fact that it is so hard to hold them. This is especially true when they are to be rolled. A handle made from 1¼ by 5/16-in. strap iron will make the work much safer and easier than the usual method of pushing or kicking the barrel along. The straps reach about halfway around the barrel, and have a wooden or pipe handle and a strap-iron brace to make the device rigid.



Barrels are Easily Pushed or Rolled into Place When a Special Handle is Used

Tool Holder for Cutting Rings from Tubing

Machining rings is often a very laborious process where each ring is cut and turned separately. The work is easily and quickly done by using a special cross-slide block which holds a number of cut-off blades. The block is mounted on the cross slide with the gang of cutters set so that each is 1/32 in. ahead of the next one. The result is that while one ring is being cut off completely the others are still supported. The stock of which the rings are to be made is gripped in the chuck, and may be bored and turned as usual. This method of making rings saves most of the time generally consumed in changing tools.

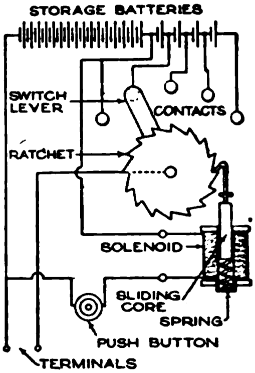


A Special Cross-Slide Block Holding a Gang of Cut-Off Blades Saves Time and Labor in Machining Rings

Renewing Mouse Traps

Mouse traps of the ordinary wire-spring type may fail to work when the spring becomes so weak that the mouse is permitted to escape. It is possible, in such cases, to renew such traps by winding the spring an extra turn around the center wire, so that the force of the spring is increased.

Remote Control for Storage-Battery End-Cell Switch



Where storage batteries are used for lighting purposes, it is the usual practice to provide a number of extra end cells that can be switched into the circuit as required, to keep the voltage constant while the cells are discharging. An easily constructed remote - control switch for these cells is shown in the diagram. The switch lever is fitted with a toothed wheel, cut or filed from heavy sheet iron. A magnet coil or solenoid is wound on a brass tube, ¼ in. in diameter, fitted with heads, 1 in. in diameter, and separated 1¼ in. This space is wound full of No. 24 gauge enameled-copper wire. The core is a length of soft-iron rod that slides easily in the tube, and which is slotted at one end to take the hook made from a piece of clock spring, held in place by a rivet. A small coil spring serves to raise the core when it is released by the magnet.

A push button is connected with the solenoid, as shown in the diagram. When the push button is pressed, the solenoid draws the core down, turning the switch one point, thus connecting one cell to the current. The button may be mounted in any convenient place, and the switch advanced one point when the voltage is noticed to be dropping. The switch is replaced on the first point when the batteries are being recharged.—Thos. W. Benson, Philadelphia, Pa.

A Simple Carrier System for the Greenhouse

By J. HORACE VAN NICE

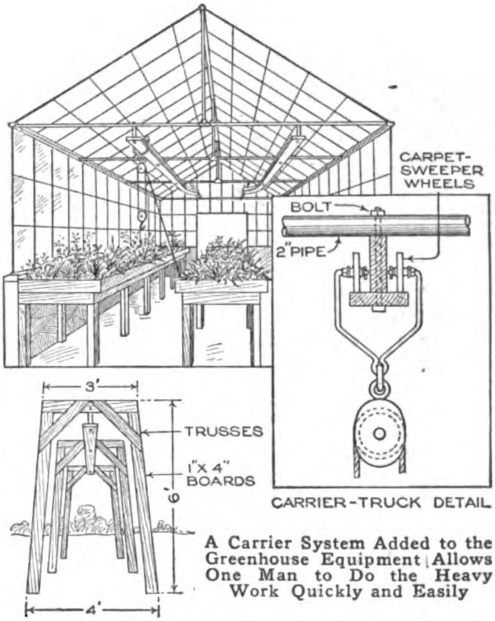
SINCE a greenhouse is usually built with narrow aisles, it is difficult to move heavy loads of earth or plants either in or out of the structure. Yet, among the florist's regular tasks are those of changing the dirt in the benches—the hardest work of the year—and the almost daily task of moving potted plants, or other stock, from one part of the house to another. The carrier system described, while designed originally to relieve the situation in and about the greenhouse, has helped solve the labor problem all about the truck garden, and has been adapted to the needs of a baker and a machine-shop owner who saw it in operation.

Two units, or members, make up the system; these are a carrier, and a track upon which it runs.

The track was made from 1 by 4-in. boards, bolted together to form an inverted "T." Since the completed track could be cut and fitted like a single piece of lumber, each greenhouse was quickly supplied with sections extending the length of each aisle, with turns to the doorway. Space was left between the track ends and the front wall of the greenhouse, so that the carrier truck could be put on or taken off each track. Hence but one carrier truck was required, as it could be quickly changed to the section of track leading to the spot where the load was to be dumped. The track was bolted to the cross purlins through holes drilled in the purlin pipe.

For the carrier truck, two small rubber-tired wheels were taken from a discarded carpet sweeper. These were put on the ends of a steel-rod axle, which was bent to loop under the track upon which the wheels rested. On one side of each wheel a washer and a large bushing were used, the latter made of a nut drilled larger than the rod; on the other side were placed a washer and a cotter pin. Into the loop was wired the eye of a tackle block.

In operation the carrier system was both simple and effective. Dirt was brought to the greenhouse door in a wagon. Here it was shoveled into a large galvanized-iron bucket holding about a wheelbarrow load; pulled up to the track by means of the pulley, so as to be out of the way of the benches, and handy for dumping; then pulled along the track to the place desired—all the work being done by one man, and without overexertion. The large loads were easily handled, and filled up bench space rapidly. For potted plants, a flat was slung from the truck on four wires. By steadying it while drawing it along the track, 25 large potted plants could be moved at once, in spite of the narrow aisles, by the one man.



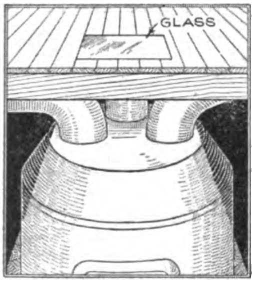
A Carrier System Added to the Greenhouse Equipment Allows One Man to Do the Heavy Work Quickly and Easily

Since there remained the work of bringing the dirt to the greenhouse itself, and because of the waste of time in transferring the dirt from the wagon to the bucket, the system was later extended by supporting a track, on cheap trusses, from the greenhouse to the dirt pile, as illustrated. In this way the entire operation was performed by one man, without the aid of a horse. This track being movable, it was used for several odd jobs, such as moving the crops in from the truck garden, carrying coal to the boiler room, and fertilizer to the garden. While the first cost was large, the many uses of the system made it pay for itself.

Blotter Mounted on Desk Telephone

One place to mount a blotter, where there is small danger of its becoming lost, is on the bottom of the desk telephone. While a handier blotter should be provided for regular use, it will often save time to have this peculiar arrangement ready in case the blotter is required suddenly and the ordinary one has disappeared.—Violet Johnson, Rockford, Ill.

Furnace Lighted from Room Above

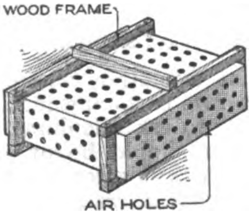


A furnace fire may be tended to in the evening without carrying a light or matches to the cellar, by placing a heavy pane of 8 by 10-in. glass in an opening cut in the floor above the furnace. This pane of glass is placed in the floor border, and does not interfere with the rug. It lights up the space near the furnace as long as there is a light in the room above. In homes where electric lights cannot be had, it should be very handy.—Edward Stumpf, Jersey City, N. J.

Portable Gas-Welding Outfit

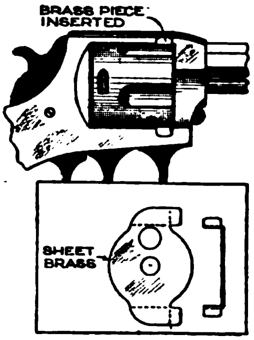
Oxyacetylene welding is used in most shops and factories for repair work, but, as a rule, the outfit is stationary. Thus, all machinery requiring welding must be dismantled and taken to the welding bench. A much better and quicker method is to mount the oxygen and acetylene tanks on a hand truck, so that the complete welding outfit may be transported to the job. Often this scheme saves lifting and trucking heavy castings. The gas tanks are strapped to the truck in such a manner that new tanks may be substituted for the exhausted ones, without halting the work for any appreciable length of time.—Kenneth Coggeshall, Webster Groves, Mo.

Chicks Provided with Air during Shipment



Much trouble is experienced in shipping very young chicks, even when using the corrugated-paper shipping boxes, prepared for that purpose, because they receive so little air on the trip. This is due to the fact that these boxes are sandwiched in between other packages. The difficulty may be overcome by surrounding the shipping box with a wooden frame which keeps other packages from coming completely in contact with the paper crate. Adequate ventilation may be insured by punching numerous holes in the corrugated board, for the wooden frame provides an air space, no matter how many parcels are shipped together. A stick across the top pieces serves as a handle, and holds the sides of the frame rigidly together.—J. T. Bartlett, Fort Collins, Colo.

Curing Revolver "Spitfire"



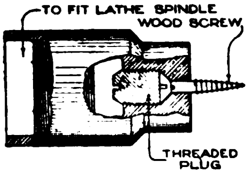
A revolver that was satisfactory except for the common fault of many low-priced guns, that of spitting fire sidewise at the forward end of the cylinder, on account of there being too much space between the cylinder and the barrel, was remedied in the following manner: A piece of sheet brass, of a thickness that nearly filled the space, but left play enough for the cylinder to turn freely, was cut as shown in the drawing. Two holes were drilled, one for the bullet hole and one to fit over the projection on the cylinder. They were reamed out to the proper size with a taper reamer. The piece was bent, as shown by the dotted lines, making it fit over the cylinder, after which the gun was assembled. This eliminated the annoying side flash, and gave more shooting power by keeping the gas in the barrel behind the bullet. The sides of the piece, covering the holes in the cylinder, were to keep lint and other foreign matter from collecting around the bullets. No dimensions are given, as the design and caliber of the revolver determine them in each case.

Keeping Salts in Battery Cells from Creeping

Paraffin is used almost universally for coating the tops of the glass jars of wet-cell electric batteries, to prevent creeping of the salts. Sometimes the paraffin is colored by mixing in it, while it is molten, paint powders of different hues. Green and red pigments have thus been used frequently. To coat the top of the cell it is dipped in a vessel of molten paraffin to the proper depth, or the hot paraffin is applied with a brush.

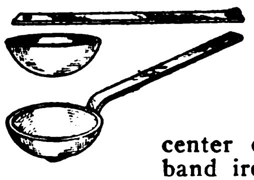
One black compound which has given satisfaction for use on the tops of dry cells and also for coating the tops of carbons is composed of equal parts of tar and pitch. Another is composed of pitch, 1 part; lampblack, 1 part; paraffin, 8 parts. This mixture is heated until molten, then mixed by stirring. It can be put on either with a brush or by dipping the carbon in it.

Screw Chuck with Removable Screw



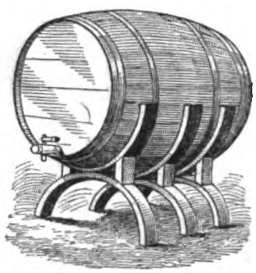
One of the most useful types of chuck to the pattern maker is the plain screw chuck having a center like a wood screw, on which the piece to be turned is held. The objection to the use of such chucks is that the threads of the screws usually get damaged by being knocked against metal surfaces. The chuck shown in the sketch presents the feature of a removable center, which consists of nothing more than an ordinary flat-head wood screw. The body of the chuck is threaded to fit the lathe spindle, and in the other end is a hole in which some common size of wood screw fits snugly. The screw is held in by a threaded plug, and it is a matter of only a few seconds to remove the plug and screw and insert a new screw.

Ladle for Lead or Solder Made from Alarm-Clock Bell



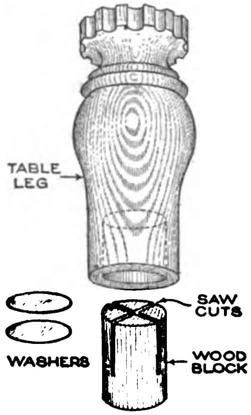
A small ladle for soft metals, such as solder, lead, and pewter, may be made of the bell from an old alarm clock and a piece of band iron, ¾ in. wide, ⅛ in. thick, and 10 in. long. In the center of one end of the band iron, drill a hole the same size as the hole in the bell. Bend the band iron in a vise so that when the two holes come together the band iron will fit the surface of the bell. Rivet the band iron to the bell to form a handle, and bend it back a little above the edge of the bell. If the bell becomes loose, a second rivet may be put through the handle and bell, farther up.

Barrel Supported on Fellies from Old Wagon Wheels



Old fellies, such as used to form the rims of wide-tired wagon wheels, can be used to support barrels, or galvanized-iron tanks. Two sections are bolted together, with their curved surfaces opposed, as shown in the drawing, to form each support. Small wooden blocks, nailed in the angles, give added strength. For a barrel, the center felly must be larger than the end fellies, and the center base felly must be cut lower than those used for the bases of the end supports. The trestles formed in this way may be fastened together with longitudinal braces, but this is not always necessary. The fellies form an unusually strong support.

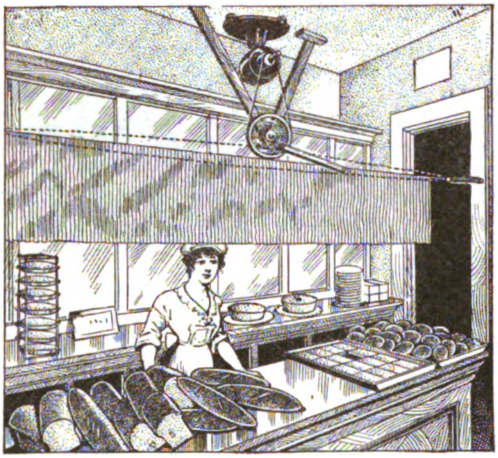
Table-Leg Adjuster



A table is often unsteady because the floor on which it stands is uneven, and not because the legs are of unequal length. It is a mistake to cut the legs whenever moved, as the table would only be unsteady again if moved to another place. A good and simple adjuster can be made by drilling a fairly large hole into one of the legs, and inserting a tightly fitting plug of hard wood, as shown in the illustration. If the plug is made a tight, springy fit by two saw cuts, it will be found to spring in easily without a tendency to drop out. Adjustment of height is made by putting one or more thicknesses of cardboard on top of the plug. The leg in which the adjuster is fitted should be cut down ¼ in. so that it can be made higher or lower than the others by means of the plug.—Morris G. Miller, New Rochelle, N. Y.

Paper Streamers in Motion Scare Flies Away

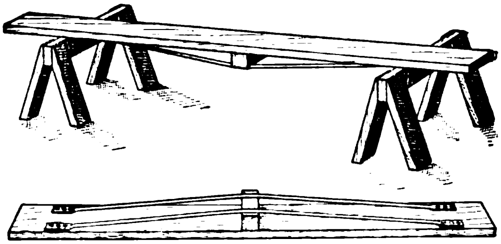
In a bakery, or other place where the flies are troublesome, use may be made of a device which drives the pests away from the food which attracts them. On a wire stretched above the counter, are pasted numerous streamers of paper. A long coil spring at one end of the wire permits it to be pulled to one side, and then jerks it back into place. A fan motor, with a small grooved pulley substituted for the fan, is placed on the ceiling over the wire. A large wheel, such as found on sewing machines, is held in place just above the wire by a hanger from the ceiling and is belted to the motor. A connecting rod pivoted to the wheel, and clamped to the wire, keeps the streamers in a flutter when the motor is running, thus driving all flies away from the vicinity.—C. C. Spreen, Detroit, Mich.



A Mechanically Agitated Wire Hung with Paper Streamers Drives the Flies Away from Food in a Bakeshop

A Nonsag Scaffold Plank

A plank for a scaffold can be made rigid enough to sustain the weight of one or two men without springing uncomfortably, by bending light iron rods over a short piece of 4 by 4-in. lumber placed in the middle of the plank. The ends of the rods are flattened and drilled for screw holes. When inverted between two "horses," the plank so prepared has none of the usual spring of an ordinary board. It is especially fine to use with ladders.—John C. Smith, Seattle, Wash.



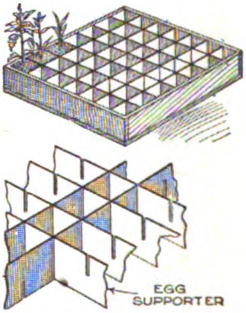
A Scaffold Plank Braced with Iron Rods, That will Not Spring under the Weight of Two Men

Filling Up Cracks in Concrete

For permanent repairs in cracked concrete, use old newspapers soaked and softened in linseed oil. Clean out all dirt from the cracks or joints, then paint them on the inside with red lead and oil. When this is hard and dry, fill the cracks with the soaked paper, smooth off with sandpaper, and, if well done, a nice smooth job will be the result.

A Spacer for Growing Plants

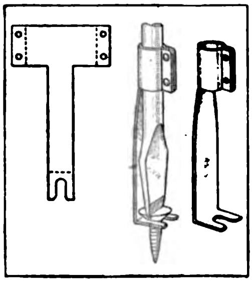
Plants to be transferred to the garden should be removed without disturbing the soil about the roots. This is easily accomplished if, at the first transplanting, they are set into a flat divided by an egg-crate spacer.



Testing Seed by Placing It in Water

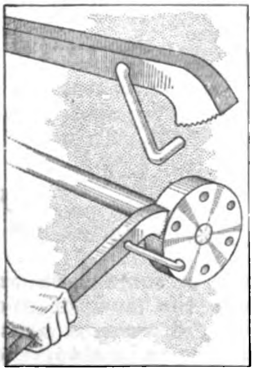
From time to time gardeners have old seed on hand, and they do not know whether to risk using it or not. Since the need for economy in seeds is so great, it is important that no live stuff should be thrown away. Although a few vegetable seeds, such as those of parsnip, carrot, peas, and beans, are very unreliable after the first year, many kinds, if kept damp-free, retain their vitality for a much longer period. A sure test for seeds is easily made. Get a bowl into which is placed 4 or 5 in. of warm water. Then scatter a few of the seeds on the surface. After an interval, some of the seeds sink to the bottom while others remain floating. It is always the dead seeds that go down, and the live ones that keep on the surface. The time needful for carrying out the experiment varies. The seeds of cabbage, radish, and turnip, for instance, sort themselves out at once. Those which have wings, like the parsnip or carrot, or are protected in a kind of a shell, such as beet, take longer, owing to the air with which they are surrounded. Sooner or later, however, the dead seeds go to the bottom. In the case of those seeds which are slow in answering the test, the decision may be hastened by rubbing them between the thumb and finger.

Screwdriver Attachment Holds Small Screws While Starting



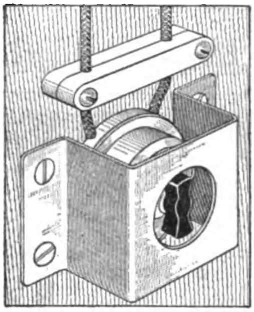
Small screws which are hard to hold while being started, or larger screws which cannot be held because of the awkward position made necessary by the work, may be handled easily by using a little attachment on the blade of the screwdriver. A piece of tin or other light sheet metal is cut to T-shape. At the head end four small holes are drilled, and at the other end a notch is cut. The head must be bent around the blade of the screwdriver and riveted through the holes bored. It should be tight enough on the blade to remain at any point to which it may be slipped. The notched end is bent at right angles to hold the head of the screw. By using this attachment, screws may be driven in awkward places, one hand only being necessary for the work. When not needed, the device may be slipped up on the blade.—George Simonson, Springfield, Massachusetts.

Pipe-Flange and Coupling Wrench



The sketch shows a handy and rugged pipe-flange wrench that is quite simple to construct. The foot, or point, of the wrench is curved, and may have teeth filed in it. Links of various sizes adjust the tool to a coupling or flange of any size.

Protecting Snap Switches

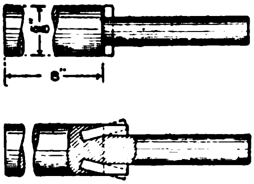


In barns, and other places where open-work electric wiring is installed, the breaking of switches is a common occurrence, since the knob and the porcelain base are exposed. This trouble may be avoided by protecting each switch with a No. 14 gauge sheet-iron guard. The iron, bent to the shape shown in the illustration, and screwed to the wall, or post, will protect the switch from ordinary knocks or bumps. A hole cut in the sheet iron, with its edge rounded off, permits the turning of the switch.—J. A. Weaver, Baltimore, Md.

Make Drawings on Reverse Side of Cross-Section Paper

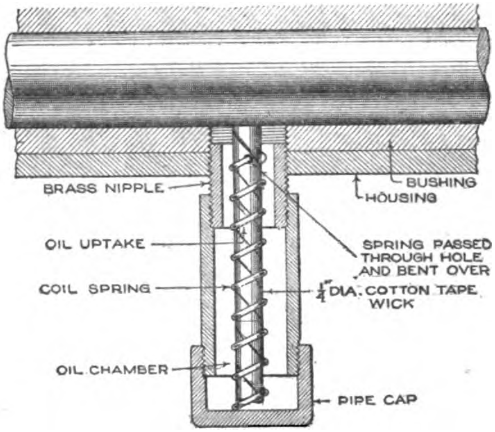
Drawings and curves, drawn on cross-section paper, or tracing cloth, to be blue-printed, are usually made on the same side of the paper or cloth as the printed crosslines. It will be found better to draw them, when possible, on the reverse side, so that changes can be made without erasing the printed lines.

Inserting Drive Pins in Arbors for Shell Reamers



Arbors for shell reamers are quite often made as shown in the upper sketch. The strength of the arbor is thus diminished by the amount of metal cut out to form a hole for the pin. An arbor made as shown below is not open to this objection, and the full strength of the bar is retained. The pins set into the shank of the reamer do not affect the strength of the arbor, since the part from which the metal is cut out is not the point where failure would occur if overstressed. The projecting ends of the pins are hammered down flat, as shown by the full lines, and can be dressed off if necessary, so as not to project beyond the diameter of the reamer.—M. L. Lowrey, Livermore, Calif.

Homemade Wick Oiler for Small Shafts


BRASS NIPPLE
BUSHING
HOUSING
OIL UPTAKE
SPRING PASSED THROUGH HOLE AND BENT OVER
COIL SPRING
1/4" DIA. COTTON TAPE WICK
OIL CHAMBER
PIPE CAP

A Wick Oiler Adapted to Small Shafts Reduces the Danger of Burned-Out Bearings

Motor generator sets on some automobiles have no provision for oiling, other than holes in the bearings. Since it is easy to overlook these when pressed for time, they may be burned out because of having been run when dry. The wick oiler described, while not recommended for heavy work with large shafts, will supply the small amount of oil specified by the makers of automobile electric equipment. Into a hole drilled and tapped in the bushing and housing, insert a 1/4-in. brass nipple. For the oil chamber, use a short piece of pipe, with a cap on the end. The wick is either a 1/4-in. felt wick, or one made of heavy cord wound with cotton tape. This latter makes a very good absorbent wick. It is held against the shaft by a light coil spring, the upper end of which is threaded through a hole in the upper part of the wick, and clamped tightly around it. Such an oiler needs little attention, and is not difficult to make. It is filled by unscrewing the oil chamber from the nipple.—P. P. Avery, Garfield, N. J.

Setting Setscrews Tightly against a Shaft

Setscrews which must be drawn down very tight with a wrench will often twist off during the effort, and this always brings a troublesome situation. Setscrews can be made tighter without excessive twisting, if they are tapped moderately hard with a hammer while turning, after the point has come in contact with a shaft. In this way, the direct force from the hammer blows is added to the force produced by tightening the thread, the two working together to cause the end of the screw to sink into the end of the shaft and hold securely.

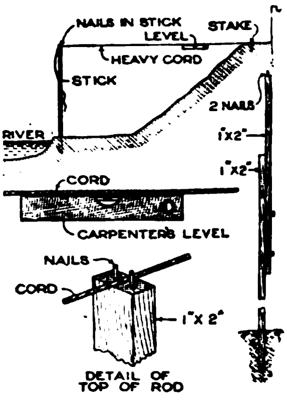
Cotter Pin as Electrical Clip

A split cotter pin, with a wire soldered to the eye, makes a good clip for the lineman's kit. It is easily slipped over the wire, and as easily pulled off, but makes good electrical contact.—H. F. Barwick, Shawinigan Falls, Can.

Spading Grass with a Garden Fork

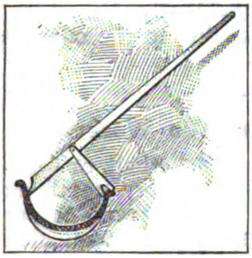
A lawn in which the grass looks thin and dull-colored can be improved by using a garden fork to loosen the soil. The fork is sunk to a depth of 6 in. and worked back and forth until the dirt is loosened. The process is then repeated every few inches until the sod has all been gone over thoroughly. After putting on a light coat of lawn fertilizer, sprinkle well, using a fine, soft spray, or a length of pipe with several rows of very small holes drilled in it. The grass will be much healthier after the treatment, presenting a luxuriant thickness.—F. F. Burnstead, Long Beach, Calif.

Carpenter's Level Takes the Place of a Surveyor's Level



While it is often necessary to find the difference of level, or elevation above a certain level, of an embankment or uneven bit of land, it is usually expensive to hire a surveyor for the few minutes the work would take. Nor is his instrument obtainable by all. The work need not wait if a carpenter's level, two 1 by 2-in. sticks, a long cord, a stake, and some nails are handy. After setting the stake in the top of the embankment, drive one of the 1 by 2-in. pieces into the ground at some spot on the lower level. Into the end of the other 1 by 2-in. piece, drive two nails. This piece is to be held upright along the one driven into the ground. Stretch the cord from the stake, between the two nails, down to where the hand grips the stick. Have some one hold the level against the underside of the cord, making sure that it touches the cord along the whole edge. Now raise the stick until the cord is level, then drive in nails to hold the two sticks together. The top of the stick is level with the top of the embankment, and the elevation of the spot where the stake was driven can be measured at once on the 1 by 2-in. pieces.

Tire Tool for Spreading Beads Apart

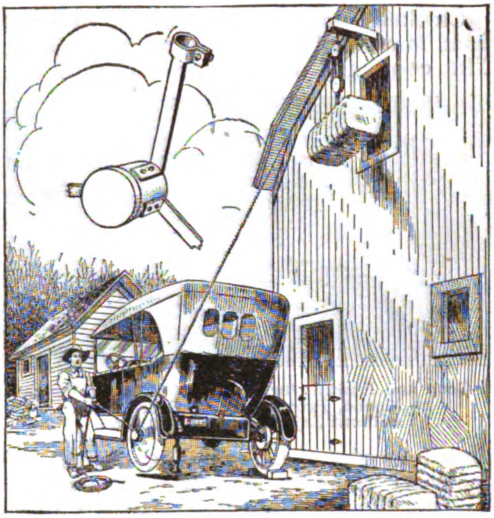


The simple tool illustrated makes easy the awkward job of separating the beads of an automobile tire for inspection, or for inserting or removing an inner tube. For tires of ordinary size, the short arm should be about 6 in. long, and the distance from the pin to the end of the long arm should be the same. By sliding the tool along, and spreading the tire at successive points, it will be found easy to get at the inside.—L. E. Turner, Hartford, Conn.

Hoisting Drum to Fit Rear Wheel of Auto

In cases of emergency, the rear, or driving, wheel of an automobile may be used as a drum around which the line from a hoisting tackle is wound. The power from the wheel, when turning free from the ground, is sufficient to exert great force in winding up the tackle rope. For that purpose, the drum described was designed to be attached directly over the hub, and to the spokes of the wheel. It may be quickly put on or taken off, and is small enough to prevent the wheel, when turning under normal speed, from being unduly strained by heavy loads.

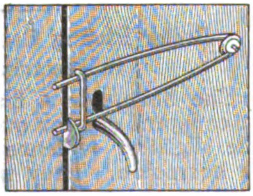
A solid piece of oak, about 8 in. in diameter, should be turned out in the shape of a cylinder, 5 in. long. For large cars, this may be increased in size. Surmount the drum with a disk, somewhat larger, to act as a rim, and bore a hole in the opposite end of the drum just large enough to fit snugly over the hub of the wheel. Then make three arms of strap iron, long enough to reach a good way up the spokes of the wheel. Bolt these at equal distances around the circumference of the drum, setting them in flush.



The Addition of a Small Drum to a Rear-Wheel Hub Makes Possible the Use of a Car for Hoisting

To operate, back the car up until it is near the tackle, and jack up the wheel upon which the drum has been placed. The other wheel must be blocked so that it will not turn. Give the hauling rope a few turns about the drum, then apply the power to the wheel and at the same time pull easily upon the rope, keeping it taut on the drum. In this way heavy loads can be raised that would otherwise be beyond the ability of one man to handle.—L. B. Robbins, Harwich, Mass.

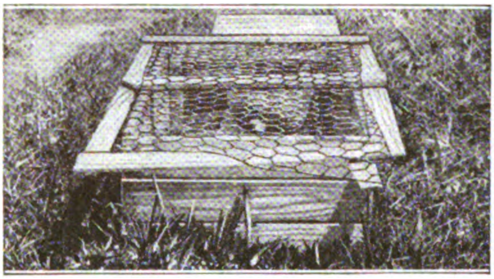
Door Latch Made from Wire



A spring door latch can be made in a few minutes, if a piece of rather springy heavy wire is at hand. It is wrapped twice around a rod or stick to form the spring, and the ends are cut to the proper length. The guard, which forms the door handle and takes the place of a knob, may be made of wire also. The catch is of the regular type used with lift-up latches, or can be made from a window-shade holder. A stick, or a piece of heavy wire, makes a very good lift.

Movable Chicken Coop Raises Healthy Chicks

Chickens never grow well when confined in a small coop, with no green food. The coop and run illustrated were designed to give small growing chicks the necessary plant food. without in any way injuring the grass in the lawn where they were kept. The coop was made from a packing box, covered with tarred felt to protect the chicks in rainy weather. The runway was a frame, made of miscellaneous old boards, covered with poultry netting. The space between the boards was large enough to allow the little chicks to slip out, and thus range over the lawn as they pleased, while the mother hen was confined. Since there were no trees, it was necessary to throw a piece of burlap sacking over the runway for shade during the hot part of the day. This portable coop and runway was moved every morning, giving the mother hen fresh grass, and the chicks a new range every day, at the same time leaving the grass uninjured. The runway could be adapted to city lots by making it impossible for even the chicks to escape. They would still have green food, though they would not get so much exercise, which is nearly as important as the food.—S. R. Winters, Washington, D. C.



A Coop and Runway for Growing Chicks, Which can be Moved, Provides Fresh Green Food without Injuring the Grass Plot

Boiler Pitting Caused by Ground in Electric Circuit

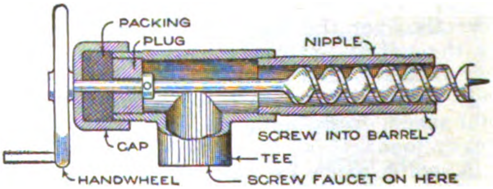
The boilers in a large plant had been in constant use for over 10 years without the slightest evidence of internal pitting or corrosion. They were practically free from scale, as the condensate was returned from the heating system and cooking apparatus, and the make-up water, about one-third of the total, was fairly good. Suddenly, pitting occurred to an alarming extent, and the engineer was completely at sea as to the cause. At about the same time, he noticed that the storage battery, supplying current for the house-telephone system and electric bells, was failing; that is, required much more frequent charging to maintain it at the proper strength. The battery seemed to be in fairly good condition, so grounds in the wiring were suspected. The engineer finally located the trouble in an underground metal conduit running from the main building to the power plant, in which were three twisted telephone pairs. When the wires from the conduit were pulled out, it was found that the insulation on all of them was water-soaked and rotten, and that the conduit was corroded through in many places. A new conduit and new wires were installed. This ended the battery trouble, and also the pitting in the boilers, which evidently had been caused by electrolysis, due to the current leakage.

Knee Guards for Tile Workers

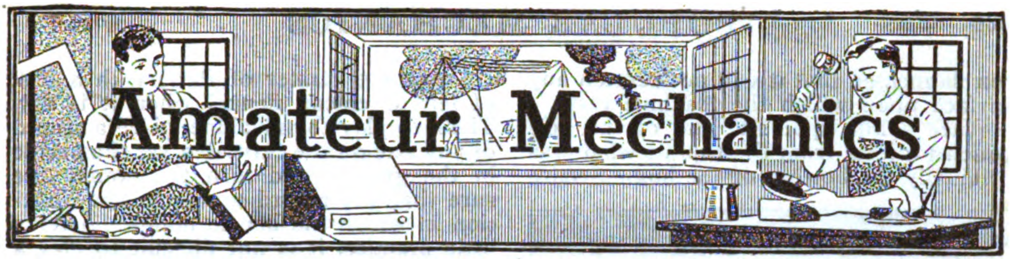
A pair of discarded basketball, or football, knee guards make handy comforts for cement finishers, tile workers, carpet layers, and all others who are compelled to work most of the time in a kneeling position. Even a new pair of guards, bought for this use, will repay the worker in the convenience of these knee cushions.—Abel Green, New York, N. Y.

Screw Pump Hastens Flow of Heavy Oil

Where heavy oil had to be taken through a faucet from a barrel, the flow was often found to be so small that much time was wasted. The condition was remedied by installing a pump to help the flow of oil, which was made from a short auger bit, as shown. By turning the handwheel in the direction to force the auger inward, the oil is forced outward through the faucet.—H. W. Hahn, Des Moines, Ia.



Heavy Oil Which Flowed Very Slowly through a Faucet was Speeded Up by the Use of an Auger Pump



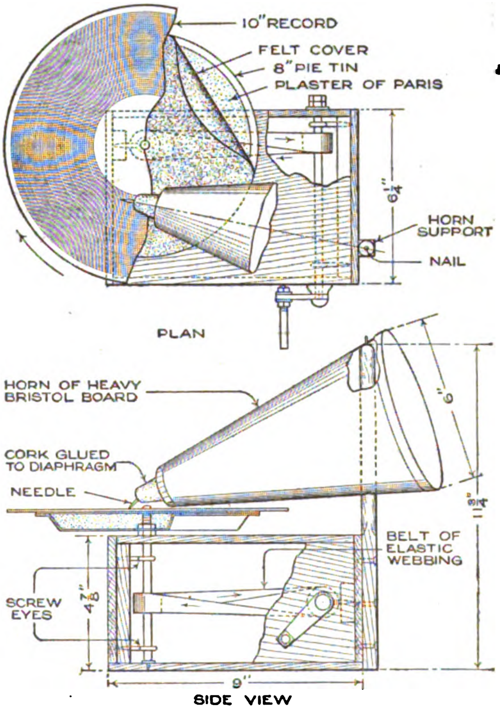
A Toy Phonograph

BY FRANK M. RICH

A PHONOGRAPH seems very mysterious and complicated to the average boy. He can, however, make one for himself which will play the ordinary records quite satisfactorily. The machine described here is not hard to make, and does not require expensive materials.

Secure a small wooden box with a hinged top, to be used bottom up, for the base. Fasten blocks of soft wood into each end of this box on the inside, in the positions shown. This may be done by gluing them in and then driving several fine brads through from the outside, clinching them on the inside. Into one block, screw two small screw eyes, one ½ in. from the top, the other ½ in. from the bottom, and both of them 1 in. from one side of the box. Then bore a hole in the bottom of the box, on an exact line with the holes in the two screw eyes. A flat-headed tack should be driven into the lid of the box, also on a line with the holes in the screw eyes. Then secure a bolt long enough to go through both screw eyes, with the head resting on the tack, and the threaded end projecting 1½ in. through the hole in the bottom of the box. Wind adhesive tape, 1 in. wide, on the shaft of the bolt, halfway between the two screw eyes, to form a small pulley. Leave plenty of room for a belt between the pulley and the wood.

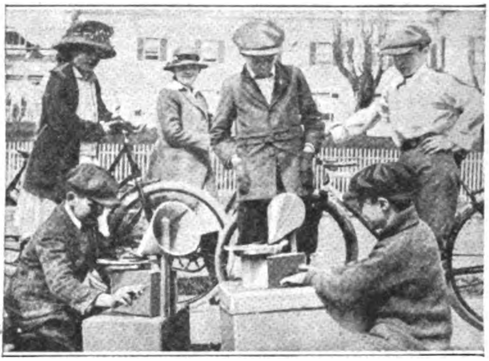
Now, insert two screw eyes into the block at the other end of the box, about 1 in. from the sides, and halfway between the top and bottom. Then bore holes through the sides of the box so that a bolt put through them will also go through the screw eyes. Before putting the bolt in, make a crank handle for it. This should be in two pieces, one of heavy tin or brass with a square hole cut to fit over the square shank under the bolt head, the other a wooden knob fastened to the heavy tin by a small bolt, with a washer and nut on either side of the tin, so that the wood handle will turn. Or this bolt alone may be used for a crank.



The Details of the Toy Are Simple, and the Materials Neither Expensive Nor Difficult to Obtain

Put the crank and a washer on the large bolt, and slip it through the holes and the screw eyes. A washer and two nuts on the threaded end will hold it, but it must be loose enough to turn easily. On the shaft of this bolt, wind tape to form a pulley, similar to the one on the other bolt. A belt of 1-in. elastic webbing, such as garters are made of, may be put around the pulleys, the ends being sewed with great care, so as to leave no hump. The belt should be just tight enough to grip the pulleys firmly. The top of the box may then be fastened with brads, or screws, so that it can be opened easily if necessary. It is to serve as the bottom of the talking machine, and may be covered with felt, or other soft cloth, such as cotton flannel, so that it will not scratch any surface upon which the machine rests.

Place a nut upon the end of the bolt which projects from the top, or what was originally the bottom of the box. Secure an 8-in. pie tin, and cut, or punch, a hole in the center of the bottom. Place the tin on the bolt end, and screw another nut on the bolt to hold it tight. Now fill the pan level full with a very thin mixture of plaster of Paris and water. The end of the bolt should extend ¼ in. above this. While the plaster is drying, make the horn and reproducer.



The Maker of a Simple Toy Phonograph Finds Himself Quickly Surrounded by Admiring Friends

For the horn, secure a sheet of heavy Bristol board. From it make a cone, 1½ in. in diameter at the small end, 6 in. at the large end, and 9 in. long. Fasten the edges with glue. Reinforce both ends of the horn with collars of the Bristol board. Upon a sheet of very stiff but thin paper, draw two circles, one 1½ in. in diameter, and the other 2 in., using the same point for the centers of both circles. Cut out the paper on the larger circle, then cut slots every half inch down to the smaller circle. Fasten this paper to the small end of the horn by pasting the flaps down over the Bristol board. This piece is to serve as the diaphragm of the reproducer.

The needle holder is a small cork, glued to the center of the diaphragm. A loud-tone steel phonograph needle is forced into the small end of the cork.

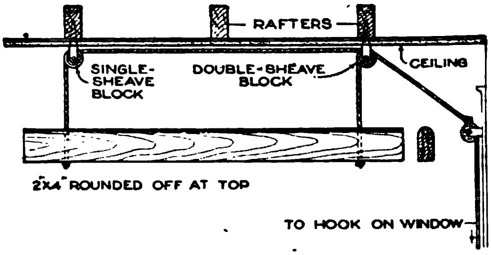
A thin stick, 11¾ in. long, is nailed or screwed to the corner of the box nearest the crank. A nail is driven into the end of the stick, and the head filed off. This is the horn support. A hole, 2 in. in diameter, cut in the horn near the large end, permits the stick to pass through. The nail in the stick fits into a hole in the opposite side of the horn. By this arrangement, the horn is permitted to swing around as the record is played.

Cover the plaster of Paris with a disk of felt or cotton flannel when it is dry. Then, to play the machine, place a record of any size on the turntable, set the needle in the groove, and turn the crank. Be sure that the record moves in the direction in which the needle points. After a little practice, it is not difficult to play a record smoothly and with a very good tone. Needles can be changed very easily, by pulling the old needle out of the cork and inserting a new one.

While the average boy can find most of the materials called for in the above description, the plan may be changed in many ways to suit either the convenience or the pocketbook of the reader, as long as the principle is right. The same boy may see a way in which he can improve on his first model. In any case, the results depend largely on how steadily the owner turns the crank.

Suspended Frame Dries Laundry in the House

In a house where there is very little room to spare, it is not easy to dry laundry on either the ordinary clothes rack or the wash line. The suspended frame described allows the wash to be pulled up out of the way while it is drying, in this way leaving the room clear for other purposes. A series of frames will hold a very large wash, and this should dry quickly, since hot air circulates near the ceiling of a heated room. The frame is made of a piece of 2 by 4-in. lumber, rounded off on one edge. It is suspended from ropes which run through pulleys to a hook screwed into some handy place. The frame is lowered, the wash put on, and then the whole is pulled up to the ceiling.—James Wilson, Maisonneuve, Que., Can.



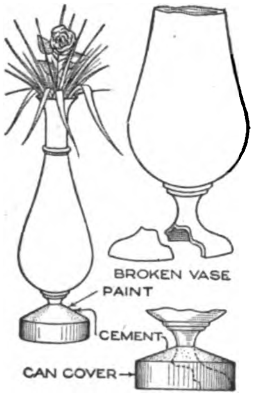
A Frame Which can be Raised and Lowered by Means of Pulleys is Used to Dry Laundry in a Crowded House

¶Tennis rackets which are too old to be worth restringing make excellent carpet beaters.

Exhausted Dry Batteries Produce Flame Spectacle

In open fireplaces, especially where wood is used for fuel, a gorgeous colored-fire effect may be produced by placing one or two old dry cells among the hot coals. The substance with which the top of the battery is sealed soon burns away, and the heat sets up a chemical action, producing a gas which burns with a flame of vivid blue, purple, and green. One old dry cell will continue the spectacle for from a half to three quarters of an hour, depending upon the heat of the fire in which it is placed. No danger attaches to this production of colored fire. It costs nothing, inasmuch as old dry batteries are ordinarily worthless, but it will provide both pleasure and amusement at fireside gatherings.

Mending Broken Vases



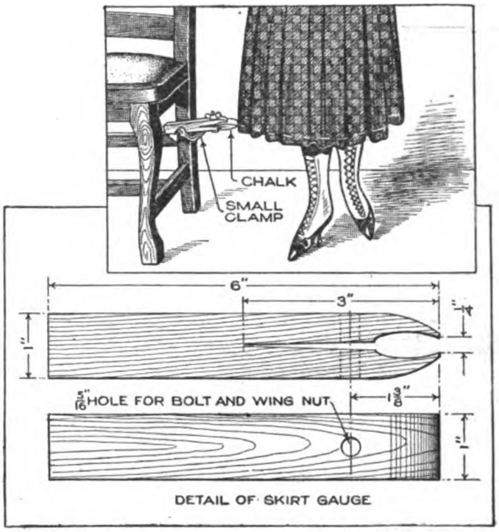
When the lower part of a vase is broken, so that it will not stand, the vase is quite often thrown away as useless, because it is difficult to cement the base together so as to be strong enough to support the weight. Such a vase can be repaired quite strongly by imbedding the lower part in a new base made of Portland cement. The cover of a tin can is used to hold the cement, which is smoothed up around the vase to a graceful shape. After the new bottom is smoothed off and painted, the vase will be better than new as regards strength, and hardly less pleasing to the eye. Also, because of its weight, it is more stable than it was originally.

Uses for Old Gas Mantles

Old gas mantles crushed to powder make an excellent polish for jewelry. The fact is becoming quite well known, and the material is being bought and sold for this purpose. The material is also made use of by mantle manufacturers, as they can reclaim from it the rare earths which are used in the manufacture of mantles.—Robert Davidson, Albany, N. Y.

A Length Gauge and Marker for Ladies' Skirts

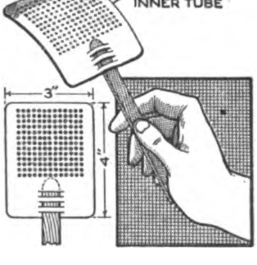
The gauge, or marker, shown in the illustration, is designed to be attached to the leg of a chair and to mark on a skirt the proper length for cutting. The instrument consists of a piece of chalk, held in a clamp made of hard wood, which in turn is attached to the leg of the chair by an ordinary C-clamp. The chalk may be held in the opening by using a 1/4 by 1 1/2-in. stove bolt with a wing nut.—Guy E. Waite, Ottawa, Ill.



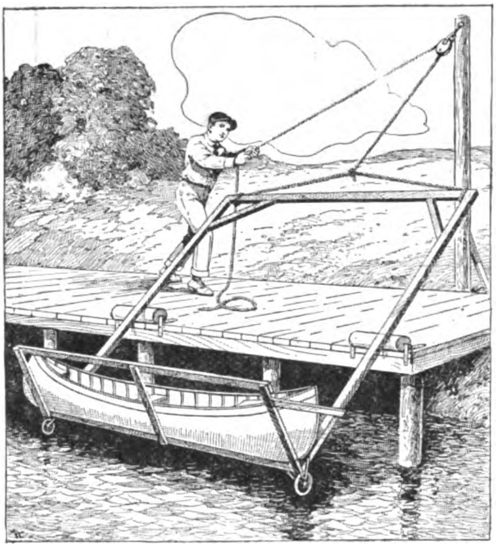
A Marker Like This Makes It Easy to Cut a Skirt to a Uniform Length at All Points

"Swat the Flies" with a Piece of Inner Tube

To make an efficient fly swatter, cut a piece of rubber, about 3 by 4 in., from an old inner tube. Make five parallel slits near one edge, into which the handle is secured by having alternate straps of the rubber on each side of the wood. Punch small holes in the rubber with a leather punch to make the swatter quiet and effective in action. This rubber fly swatter can be made by the children; it does not mar the furniture, or catch on the clothing or curtains.—W. S. Hoffman, Lind, Wash.



Handy Device for Lifting Boats Out of the Water


The Cradle Serves as Both Hoist and Truck for Small Boats

Lifting canoes and small boats out of the water and dragging them along some distance on their keels weakens them and causes leaks, perhaps more than any other one thing. Carrying them is hard work, and demands the services of at least two men. The use of wooden rollers, on some docks, helps matters, but even these are not always satisfactory or convenient. In the case of a canoe or boat club, the distance it is necessary to haul the boats to their proper places when not in use increases in proportion to the membership of the club. Where there are 50 or 60 small boats owned by members, the farthest rack is frequently 20 or 30 yd. from the water's edge.

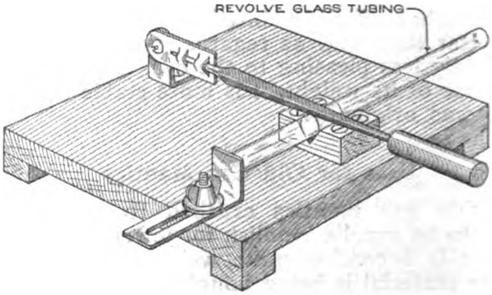
The lifting device illustrated, has been found to obviate these difficulties. It is a combined lifter and truck, for the lower part of the cradle is equipped with small cast-iron wheels for trundling along on the dock when the boat is out of the water. These may be set to run with the length or the width of the frame, or may be on swivel bearings. Canoes or ordinary rowboats can thus be handled by a single person with ease. The cradle slips into the water at the edge of the dock, and the boat is floated into it. Then, by a direct pull and lift, the boat is lifted entirely out of the water. Wooden rollers at the edge of the dock make the process easier. Once on the dock, the cradle becomes a truck.

Where boats of any considerable weight are to be handled, a rope tackle can be used for operating the cradle. A moderate amount of pull on the tackle will lift any of the larger rowboats out of the water, and pull them up on the dock. After that is done, one man can run them into any desired place, and likewise launch them by the opposite process.

The cradle is made of stout 2 by 4-in. sticks of hard wood. Its size and strength depends upon the weight of the boats to be handled. Its length should be about two-thirds that of the boats. Anything bigger than this makes it clumsy and awkward to handle. If the average length of the boats or canoes is 18 ft., a cradle 12 ft. long will answer all purposes. The depth of the cradle depends upon the height of the dock from the water's surface. If handled without a tackle, the upper part of the cradle should stand high enough above the edge of the dock for good leverage. Otherwise, one will find it impossible to tip it and draw the boat out of the water. It is a good plan always to install a tackle arrangement for emergencies. Even if as a rule only canoes or small boats are to be handled, larger craft may some day visit the club, and it will be necessary to lift them out. The advantage of this device is that it does not interfere with the landing of larger boats. It is portable, and can be removed at any time, or left standing at one side on the dock. When needed, it is a most convenient piece of equipment, and will save a great deal of hard work and trouble.—Geo. E. Walsh, New York, N. Y.

A Handy Glass-Tube Cutter

A glass-tube cutter which permits good work to be done easily and quickly, is made from a wooden V-block, a piece of board, an improvised hinged chuck, and



A Glass-Tube Cutter, Which Insures Uniformly Good Results, is Constructed from Easily Obtained Odds and Ends a small metal stop, or length gauge. The tang of the file is forced under the two straps of the hinged plate, these straps being made by slitting the metal with a chisel and bending it out.

To use the device, the tube is laid in the V-block, and the gauge set for length. By pressing lightly on the handle of the file, while revolving the tube, a circular cut is made that insures the easy breaking of the glass by tapping it next to the cut. To secure a clean break, either heat the glass at the score with a match, and then plunge it in water, or moisten the tube with turpentine, before scoring. When one edge of the file becomes worn, it can be turned so that a new edge is ready for use.—C. H. Willey, Concord, New Hampshire.

Beautiful Patterns Made by Sound Waves

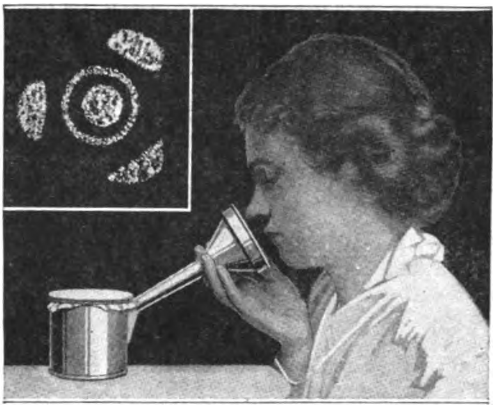
As is well known, sound travels in the form of waves. It is not, of course, possible to see these waves, but it is easy to secure a record of their effects. An easily made device may be employed for the purpose, and with one of these, patterns can be made with the voice. The construction of such an instrument presents no difficulties at all and, in fact, is a diverting toy of great scientific interest.

The first thing required will be a tin saucepan with a hollow handle. Also, a small tin funnel should be secured, the narrow end of which is a little smaller than the handle of the saucepan. Buy a piece of sheet rubber just big enough to stretch over the top of the saucepan. Then, with a little twine, one will have all that is necessary for the making of the toy.

First of all, remove the end piece of tin on the handle of the saucepan. Push the small end of the funnel right down inside the handle. Then bore a hole inside the saucepan just where the handle is fixed. Make this opening as wide as the inside diameter of the handle, so that there is an opening right through the funnel and handle. Next, stretch the piece of sheet rubber across the top of the saucepan, using string to tie it around the sides.

To show the effects of the sound waves, get some very fine powder. Ordinary flour, if really fine, is good, but the finest chalk, known as "precipitated," is better. Druggists sell lycopodium powder, which is well adapted to the purpose.

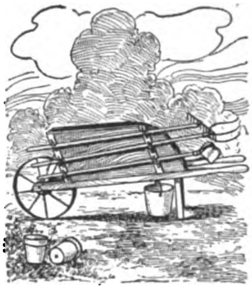
To use the device, sprinkle a little of the light powder on the piece of rubber. Then start singing into the funnel, sounding the same note steadily. The tiny bits of dust will start to move about. After a while, they settle down into quite a pretty pattern. The patterns will vary according to the kind of powder used and the note sounded.—S. Leonard Bastin, Bournemouth, Eng.



An Interesting Toy, Which Operates on Scientific Principles, Makes Patterns in Chalk or Powder When a Note is Sung into the Mouthpiece

Converting the Wheelbarrow into a Garden Truck

The amateur gardener should save himself as many steps as possible in his work, since his hours are few and every step counts. The wheelbarrow can be made to save his time and energy by adding racks on the sides, as shown, to carry cultivating tools. Make three sets of iron hooks for each side of the wheelbarrow and screw them to the edges of the dash and to the upright cleat of each sideboard. A hook under the flooring can be used to carry a bucket or extra sack. By fitting an arrow-shaped iron to one leg of the wheelbarrow, it can be utilized to furrow, mark, or cultivate, according to the angle at which it is adjusted. Garden tools can be laid in the hooks, seed or water carried in the bucket hung underneath, and the body of the wheelbarrow filled with dressing. The rack will be as useful in harvest time as it is when planting.—L. B. Robbins, Harwich, Mass.

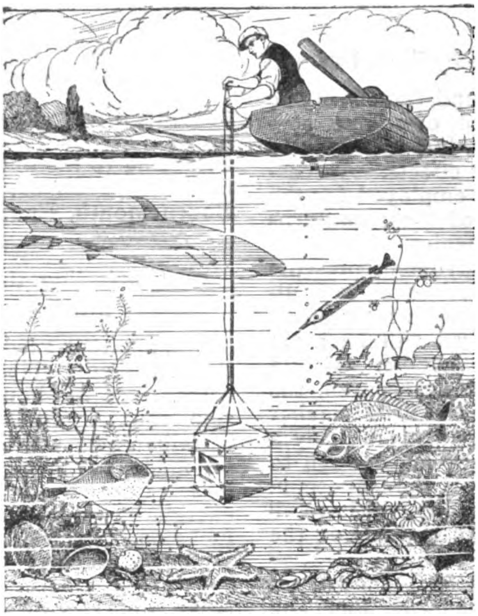


Taking Submarine Photographs with an Ordinary Camera

By JOHN EDWIN HOGG

A DELIGHTFUL pastime as well as an educational one, which may be enjoyed by any boy of average mechanical ability, is that of taking pictures under water with an ordinary camera. It is only necessary to construct a water-tight box with a plate-glass front in which to house the instrument. This is but the work of a few hours, after which all the submarine mysteries of the near-by lake, stream, or ocean may be explored photographically. Aquatic plants may be studied from the fishes' viewpoint, and indeed the fishes themselves are easily baited in front of the camera for close-range views.

Let us suppose, for instance, that the camera to be used is one of the folding type, taking post-card-size pictures. This is a standard variety and lends itself well to submarine adaptation. For housing such an instrument, the water-tight box will need to be 10 in. high, 6½ in. wide, and 8¾ in. deep, inside measurements. It is best constructed from 13/16-in. material, preferably spruce or maple, and care should be used to select wood that is free from defects. The sides are cut 8¾ by 11⅝ in., the top and bottom 6½ by 8¾ in., and the front and back 8⅛ by 11⅝ in. Both sides of this box will lap over the edges of the top and bottom members. The back will attach to lap over the sides, top, and bottom, and the front will lap over the four, making a detachable lid to permit the installation of the camera and its ready removal. The whole is put together with wood screws, placed every 1½ in. along the overlapping edges, with a brass washer under the head of each screw. Holes for the screws should be drilled to avoid danger of splitting the wood. Strips of felt, which may be cut from an old hat, should be coated with white lead and placed between the boards to serve as calking.



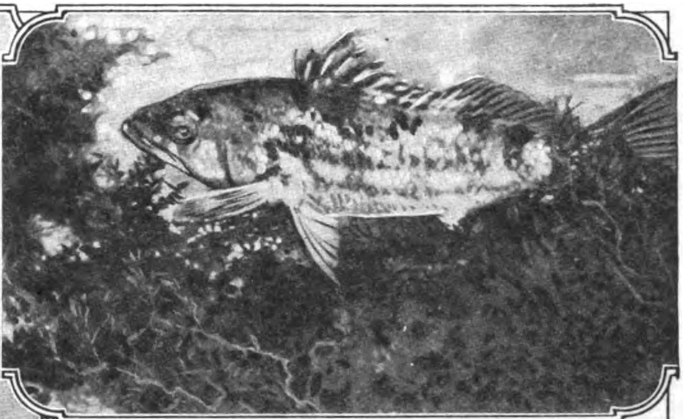
Some of the Fish Photographed by the Author are Here Shown, as Well as a Suggested Method of Using the Camera

The lid is attached by means of 10 headless machine screws, set in the body of the box, as shown in the drawing. Wing nuts are used to make the lid quickly detachable. A water-tight joint is obtained between the lid and the body of the box by the use of heavy rubber gaskets. These are made from ordinary washer rubber, such as is obtainable at a plumbing shop. The surfaces of both the lid and the edges of the box against which it fits must be planed true, and then the gaskets are cemented to the lid and box with a coat of shellac. Care should be used in locating the holes in the gaskets through which the screws are to pass.

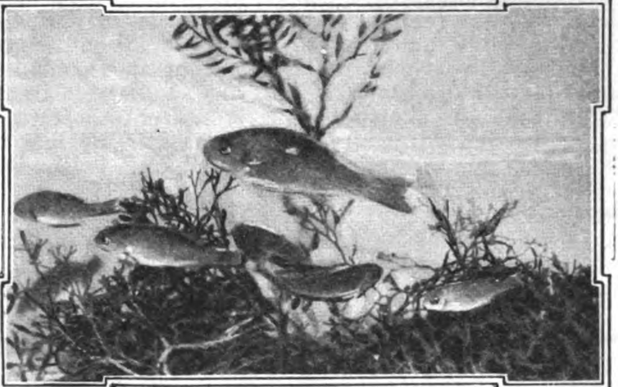
In taking underwater pictures, it will be found convenient to use films having 10 exposures to the roll. It would be annoying if the camera had to be removed from the box after each picture, so provision is made, in the form of simple water-tight fitments, by which the shutter is operated while under water, the focus may be adjusted, and the films turned up after each exposure without removing the lid from the box. Of course, if a camera of the universal-focus type is used, the construction of the box is rendered less complicated.

The focusing mechanism, as shown in the assembly, Fig. 1, and detail, Fig. 2, was made from a small steam gate valve, which had outlived its usefulness as such. It was purchased from a steamfitter's shop for the value of its weight as old brass. After the opening has been cut in the lid for the glass, the camera is fitted into the box, and work is started on the focusing mechanism. The steam valve, which is designed to be steam-tight around the stem, should, of course, be water-tight. The base of the valve is screwed into a brass plate, ⅛ in. thick, and soldered to the plate. The whole is then fitted into the lid, as shown, and the focusing slide of the camera is connected with the stem of the

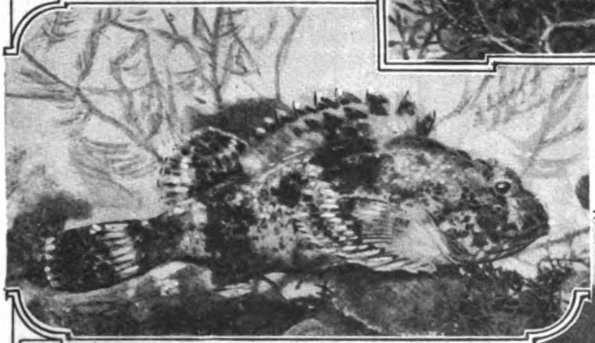
Diving for Photographs of the Sea Bottom, with Its Strange Rock Formations and Its Stranger Life Forms, Is Far Greater Sport Than the Usual One of Diving for Pennies or Pebbles



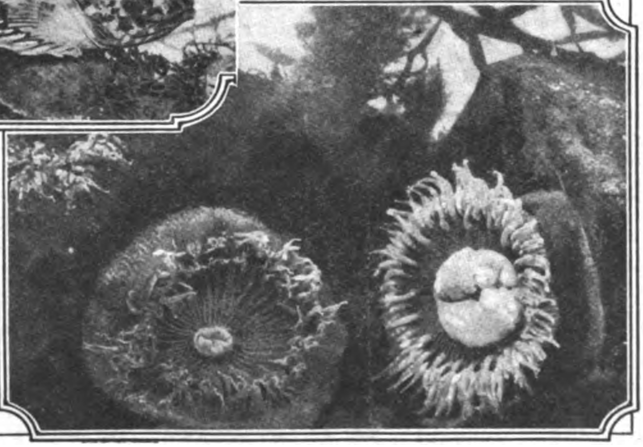
The Large Specimen of Striped Sea Bass Above was Photographed in One of His Feeding Grounds. He is Usually Found near Kelp Beds, or Other Varieties of Sea Vegetation



Even at a Distance of 12 Feet below the Surface the Camera Secures Excellent Family-Group Pictures, Such as the Above, Which Shows Perch Swimming through Seaweed



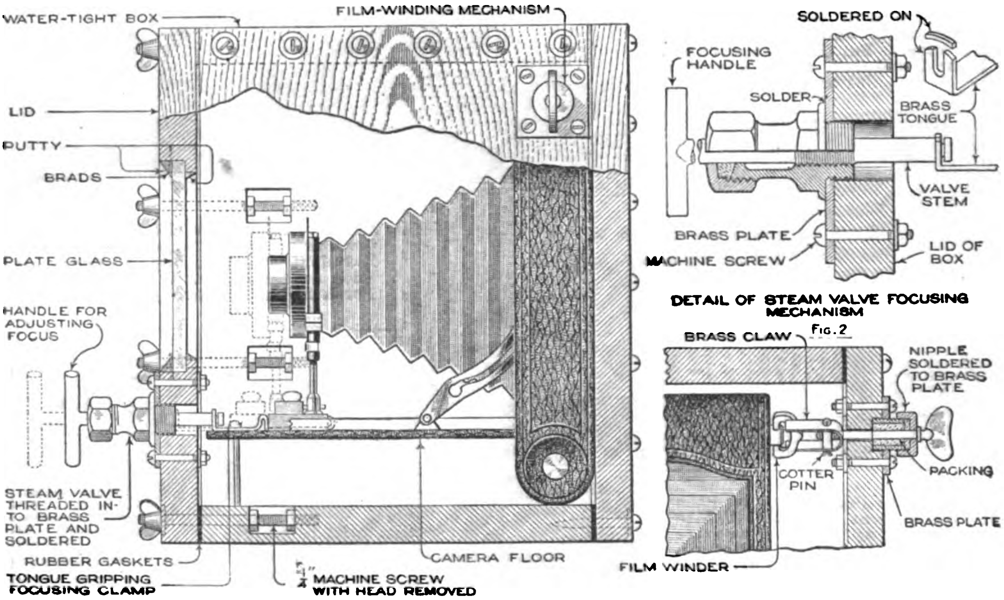
The Four-Pound Sculpin, Seen Above, was Snapped While Swimming in His Favorite Haunts, Close to the Sea Bottom. He Prefers a Depth of from 8 to 20 Feet



The Sea Anemones, on the Right, with Their Background of Sea Growths, and of Slimy-Colored Rocks, were Photographed 10 Feet below the Surface on the Pacific Coast valve by means of a brass tongue, fashioned from a narrow strip of metal. The end of this tongue is bent upward to form a right angle, and is slotted to fit into a groove near the end of the valve stem. After being fitted to the stem, a tiny strip of brass may be soldered across the top of the slot in the tongue to hold it permanently in place. The rear end of the tongue should grip the focusing clamp in some such manner as shown in Fig. 1, so that the entire rack, shutter, lens, and bellows can be moved back and forth by turning the valve handle. Turning the steam valve inward serves to focus the camera for distance by compressing the bellows, while turning the valve outward gives the focus for close-up work.

The fittings for the shutter-operating mechanism and the device for winding up the films are combinations of 1/4-in. brass bolts and automobile gasoline-line connections. For the film winder, the nipple of a gasoline union is sawed off and threaded into a hole in the center of a brass plate, 2½ in. long, 2½ in. wide, and 1/8 in. thick, as shown in Fig. 3. After being screwed down into the plate as far as it will go, the nipple is soldered on both sides to insure an absolutely water-tight joint. Four holes are then drilled around the edge of each plate, to take 3/16-in. machine screws, by which the whole is fastened in the proper position on the side of the box. The hole in the side of the box, through which the shaft will pass, will need to be slightly counterbored so the protruding portion of the nipple under the base plate will fit correctly into the wood. A coat of white lead is applied underneath the plate, around the screws, and in the screw holes, before the nuts are tightened down on the washers inside the box. The bolt to form the shaft is trimmed off to the correct length before being installed; it should have a wing handle soldered to the outer end of it for convenience in turning. The film winder engages the camera member by means of a brass claw which is attached to the inner end of the shaft by means of a cotter pin set through a square nut.

The mechanism for operating the shutter is similar, as shown in Fig. 4, but it will have a 2-in. arm which is pinned to the end of the shaft. The free end of this arm should have a small hole drilled in it to take the silk fish cord used to operate the shutter when the box is lowered into the water. A water-tight joint is secured in both fitments by partly filling the union nuts with greased packing before they are tightened down on



SIDE VIEW OF WATERPROOF BOX
FIG. 1

DETAIL OF STEAM VALVE FOCUSING MECHANISM
FIG. 2

FILM-WINDING MECHANISM
FIG. 3

A Common Folding Camera is Mounted in a Water-Tight Box, in Which are Set Windows and Stuffing Boxes. Through These the Camera Mechanism is Observed and Controlled. The Cover is Removed When Necessary to Insert a New Film

the nipples. This forms a neat little stuffing box similar to the larger ones used on the shafts of motorboats. If the outfit is to be used in fresh water, all the metal fittings may be of iron or steel. For salt water, brass or bronze must be used, inasmuch as steel or iron would be quickly ruined by rust and corrosion.

In order that the focusing table of the camera may be seen without removing the lid, a small window must be made on that side of the box. This window should be $2\frac{1}{2}$ in. long by 2 in. wide. It is made the same as is shown in the drawing for fitting the glass in the lid. Still another small window must be made in the back of the box for observing the indicator of the camera, showing the position and numbers of the films as they are turned into position for the various exposures. These windows are not shown in the drawings, as they are made similar to the large one shown in Fig. 1.

The finished box should be given three or four coats of shellac, which should be carefully worked into the cracks to insure water-tight joints. Each coat should be thoroughly dry before applying the next, and when the last coat has dried, at least two, or even three, coats of good marine paint should be put on. The paint should cover the putty around the windows and lap over slightly onto the glass. The box will have to be weighted to make it sink, and before trying the camera out in it, it should be tested for leakage under 15 or 20 ft. of water.

A sunny day will be necessary for taking submarine pictures. The light is considerably weakened under water, so the largest opening of the shutter diaphragm should be used. It may be necessary to expend a roll or two of film before one will obtain the correct exposures, but after sufficient trials, it will come easy. Then there is almost no limit to the educational enjoyment that may be had by delving into the submarine wonders that are at present practically an unexplored field to the photographer.

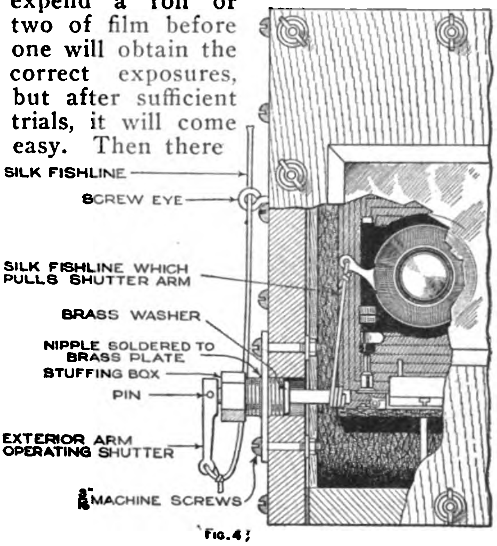

SILK FISHLINE
SCREW EYE
SILK FISHLINE WHICH PULLS SHUTTER ARM
BRASS WASHER
NIPPLE SOLDERED TO BRASS PLATE
STUFFING BOX
PIN
EXTERIOR ARM OPERATING SHUTTER
$\frac{3}{16}$" MACHINE SCREWS

FIG. 4;

The Camera Shutter is Operated by Pulling on a String, Which Operates an Arm Mounted in a Small Stuffing Box

¶Stove polish is a good substitute for the paint used to keep auto rims from rusting.

Match Safe Made from Nutmeg Grater

A nutmeg grater, which has become too dull for usefulness for its original purpose, makes a spendid match safe. The grater is hung up by the hole or handle on the larger end, the bottom of the nutmeg pocket is taken out, and a wooden plug is driven in, leaving a sufficient height above it for the matches to come just under the lid of the nutmeg pocket. If the rough surface is too dull for good grating, it is just right for striking matches.

To Prevent Sparks Setting Fire to Tents

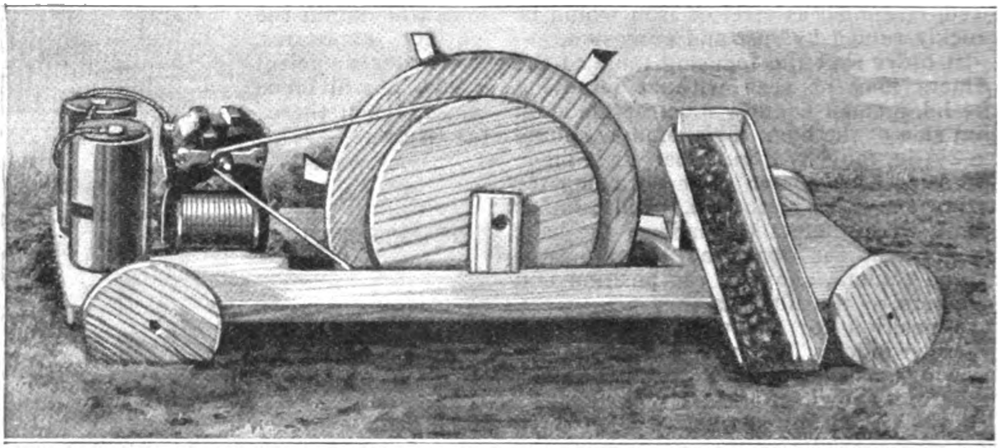
Where ordinary stovepipe is used for a chimney in a tent, there is danger from fire, due to the flying sparks. The method described has helped to avoid this danger in many cases. The process consists in punching $\frac{1}{4}$-in. holes around the pipe, in a circle about 6 in. below the top. These holes allow a counter draft to enter the chimney. Instead of the red-hot sparks being blown out over the tent roof, they only go up as far as the holes, where they circulate until cool, when they fall again, unless the draft is too strong.—W. L. Goodwin, Seattle, Wash.

Cork-Tipped Chair Legs Preserve Polished Floors

Polished floors may be saved from the wear which is due to chair legs by fitting the ends of the legs with cork disks. These may be made by splicing up a large cork bottle stopper with a sharp knife, and should be glued very firmly to the ends of the chair legs. Any unevenness in the length of the leg can also be remedied by using a cork disk of the proper thickness.—R. E. Wismer, Ontario, Can.

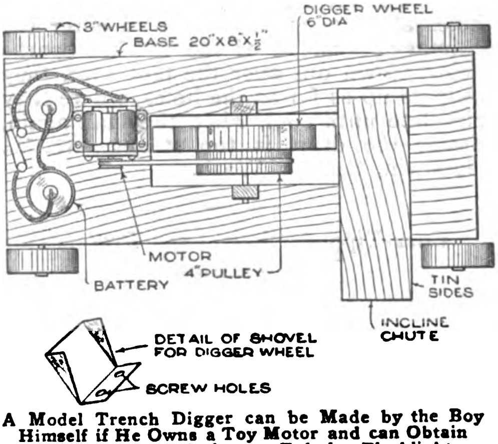
A Model Trench-Digger Toy

The photograph shows a model trench digger made by an enterprising youngster. When the motor is running, the digger cuts a smooth trench in loose soil, the toy being pushed or pulled ahead by the owner.



The Finished Toy Resembles the Powerful Machines Which were Used to Dig Trenches on the Battle Fields of Europe during the World War

On a base, 20 in. long, 8 in. wide, and ½ in. thick, four wooden wheels, 3 in. in diameter and 1 in. thick, are fastened. The digger wheel, 6 in. in diameter and 1 in. thick, is mounted on a shaft made from a large spike. On the same shaft, and nailed to the digger wheel, is a pulley 4 in. in diameter and 1 in. thick. The pulley has a groove cut in the circumference for the belt to run in. The shaft with the two wheels is mounted on two uprights, one on each side of an oblong hole, 8 in. long and 4 in. wide, cut in the base. The uprights should be 3 in. high, and the shaft should rest in holes bored in them, 2 in. above the baseboard. A small toy motor is screwed to the base, so that the pulley of the motor will be in line with the pulley on the digger wheel. Two dry cells, such as found in tubular flashlight batteries, are fastened to the base with straps, and connected to the motor in series with a small battery switch. For the shovels, sheet tin is cut and bent to the form shown in the drawing. Six of these will be required, each fastened to the digger with two small screws. The chute, which is to carry the dirt away as it is dug, is a piece of board, 2½ in. wide and 10 in. long, with narrow strips of tin tacked to the sides. It is mounted on a small block, so that the digger wheel will drop the dirt into the upper end of the chute when the motor is running. The completed digger may be painted, or not, as the maker pleases.—F. E. Brimmer, Syracuse, N. Y.



A Model Trench Digger can be Made by the Boy Himself if He Owns a Toy Motor and can Obtain Two Battery Cells from a Tubular Flashlight

Uses for Old Phonograph Records

Old disk-phonograph records, which are not chipped or otherwise broken, can be used for other purposes than reproducing music, and thus a longer lease on useful life is gained.

Several of them of the same size, when clamped together with a steel spindle passed through the holes, will make a serviceable pulley for light-power transmission.

Small sections of a record, cut out with a fine hacksaw, and placed around the house, make good match scratchers.

Basket weavers will find the smooth

surfaces of single-face records well suited for use as bottoms for fancy trays. They take a high polish, and, when shellacked, shine like glass.

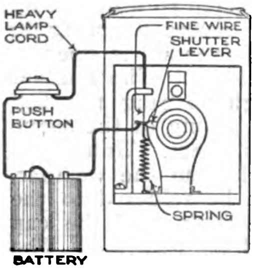
The small 6-in. records make good wheels for toy carts for children; the modern disk record is quite tough, and will stand considerable banging around.

A Drummer's Practice Pad

A student drummer devised a practice pad from discarded rubber heels, by cutting them square, and attaching them to a wooden base. While possessing all the resiliency and elasticity of the regular drumhead, this pad is practically "silent" in comparison with the customary calfskin head.

Camera Shutter Operated by Electric Fuse

A camera shutter operated by electricity enables the photographer to get into the picture. No electromagnets are used in the method described. Secure a spring, or rubber band, to the shutter lever, and put enough tension on it so that when released, it will operate the shutter positively. Then, on an insulated support, connect a short piece of one-ampere fuse wire, or No. 36 gauge copper wire, so that it holds the lever in position to keep the shutter closed, in spite of the tension of the spring, which tends to open the shutter. Connect this fine wire in series with a push button, and one or two new dry cells by a length of heavy lamp cord, as shown in the diagram. When ready to snap the picture, push the button. The current burns out the fine wire, thus permitting the spring to operate the shutter. It is easily reset by inserting a new fuse.—V. H. Todd, Orange, N. J.

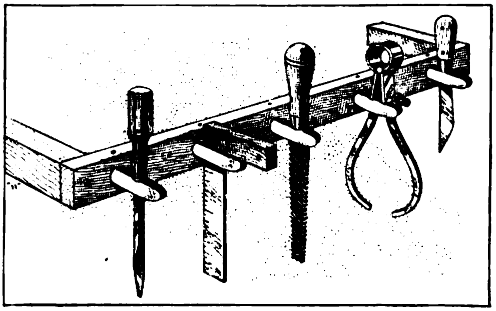


Preserving Rubber Fruit-Jar Rings

It has been found by a packing company that rubber fruit-jar rings will give better service if they are given a coat of glycerin before being used. Rubber rings so coated can be preserved much longer than their normal period of usefulness.

Tool Rack Made from Clothespins

A clothespin tool rack is very easy to construct, being made from a strip of 1 by 2-in. lumber and some old-fashioned wooden clothespins. A series of holes, the size of the pin body, are bored in the strip, and into each hole a clothespin is driven until the legs project from one side. Then the pins are secured in place by driving a wire brad down through them.



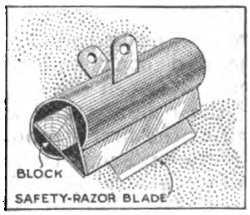
Racks Made from Clothespins Provide a Quick Addition to Space for Keeping Tools

Sulphur as a Cement

Ordinary powdered sulphur, or "flowers of sulphur," makes a good cement for some kinds of material. If the hole in an umbrella handle is filled with powdered sulphur, and the iron rod of the umbrella, heated red-hot, is inserted into the hole, the heat will melt the sulphur, and the rod will be held quite solidly when the sulphur has cooled.

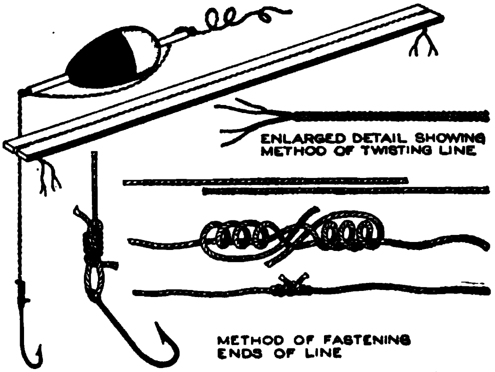
Paper Clip Serves as Handle for Razor Blade

Old safety-razor blades are handy for sharpening pencils, ripping stitches, cutting paper, opening letters, etc. They are difficult to hold in the hand without some sort of protection. For this purpose a small paper or bill clip will prove most satisfactory, as it forms a handle which holds the blade quite firmly, provided a clip with a strong spring is used. If such a clip is too deep, a block of wood placed between the blades of the clip will be of assistance.—Mrs. Grace E. Willey, Concord, N. H.



A Horsehair Fishing Line

A very fine fishing line that will never rot, that is strong, and, if made of white hair, practically invisible in the water, can be easily and cheaply made, the only materials required being a few strands of hair from a horse's tail. First, select two long, stout hairs, and hold one end. After placing them together, twist them by rolling the free ends under the palm of the hand, over the leg. When twisted, take a stick (a ruler will do very nicely) and place the ends of the twisted strand in slits cut in the ends of the ruler. This prevents the strand from unrolling while another strand is being twisted in the same way. Now, place the two twisted strands together and let them partly untwist, to form one strand of four single hairs. Soap the ends as a string is waxed. Fasten it in the slits of the ruler, and proceed to make more strands, until there are sufficient for the length of line required.


ENLARGED DETAIL SHOWING METHOD OF TWISTING LINE
METHOD OF FASTENING ENDS OF LINE

A Horsehair Fishline, Which is Easily Made, Has the Advantage of Not Rotting

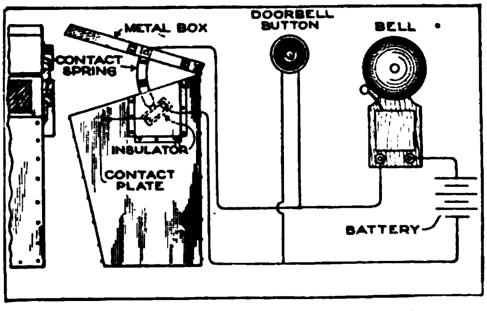
To fasten the ends securely, place the ends of two strands side by side, as in the illustration; hold the end of one strand and wrap it three or four times around the end of the other strand; bring the end back and push it through the space between the strands. Wrap the end of the other strand similarly around the end of the first strand, but in the opposite direction; bring the end back as before, and push it through the same opening but from the opposite side. Now, hold the knot so formed between the finger and thumb of the left hand, and pull it into the final shape shown. Then clip off the ends. This forms a very neat knot which will not become undone. The ends will not show to any extent if the knot is well made. Fasten a bob and hook on, as shown, completing a very good line, which will not rot and which is very strong. Three or more single hairs may be used to form each individual strand, thereby making as strong a line as needed.—Robt. C. Knox, Rogers, Ark.

Hose Cleans Out Cookstove

When a cookstove becomes filled with soot, take it down and remove it to the back yard. Flush it out with water from a hose, which will remove the soot very quickly. Then set the stove in place again and at once build a fire to evaporate the water remaining in the stove and prevent it from rusting.—Mrs. B. N. Hames, Marietta, Ga.

Mail Box Rings Electric Bell When Opened

For people who live on rural routes, a simple electric-bell circuit saves much time and trouble by indicating when the mail box is opened to deposit mail. All that is necessary is an ordinary battery-and-bell circuit, connected to a device on the mail box which causes a spring to make contact once as the lid is opened, and again as it is closed. The contact must be long enough to ring the bell plainly; the use of a spring of the shape shown will have this effect. Unless the mail box is sheltered from the weather, a tin protector must be soldered to the box around the contactor, and the cap soldered to the top of the mail box. The addition of a button to the bell circuit provides for a doorbell also. If an electric doorbell is already installed, all that is necessary is to add the contactor and its connecting wires. Rings from the two sources are easily distinguished when one becomes familiar with the sound of the two rings indicating mail.—Ed. H. Hauenstein, Wooster, Ohio.

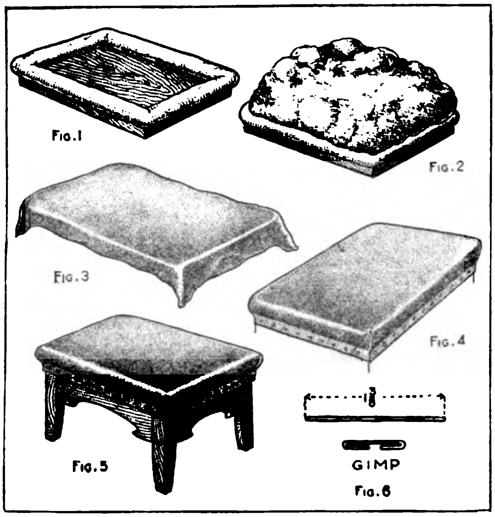


A Contactor Mounted on the Mail Box, Used in Connection with the Doorbell, Provides a Simple Signal Indicating the Delivery of Mail

Worn-Out Chair and Tabouret Make Upholstered Footstool

AN old upholstered easy chair, with the curled hair oozing from various rents in the covering, and a badly bruised and shabby tabouret with a wooden top, suggested the possibility of converting the tabouret into a foot rest. The chair was relieved of all the curled hair it contained, which was then carefully beaten to remove the dust. As the legs of the tabouret were too long for a foot rest, they were sawed off and tapered on the inside. A piece of cotton drilling was cut about 7 in. wide, and long enough to reach around the top of the foot rest, with 6 in. added for good measure. Some of the curled hair was rolled into this strip and made into a hard roll, about 2 in. in diameter; this was tacked around the edge of the top of the foot rest, as in Fig. 1, to give a firm and uniform edge to the cushion, which would not push in and allow the wooden top to cut through the covering. The lumps were carefully worked out of the remaining hair, and a pile built up as in Fig. 2. A piece of cotton cloth, about 6 in. larger each way than the top of the foot rest, was drawn tightly over the top, as shown in Fig. 3. The filling was carefully packed down in the center, and the lumps worked out with a smooth flat stick, working in from the ends to make the cushion as hard and as flat as possible, to make sure that the corners would be square, and nearly the same height as the rest of the cushion. This forced the edge roll firmly against the filling, and the ends of the cloth were brought down and tacked as in Fig. 4, the corners being built out before the last tacks were driven, and care being used to preserve the form of the edge. The cloth was folded under upon the long side and the corner made as nearly straight up and down as possible.

A piece of brown imitation leather was purchased for the covering, and tacked on, the fold of the corners being at the ends to avoid the thickness which would result if the cover had been folded the same way as the cloth of the under cover. A strip of the covering, 1⅜ in. wide and long enough to go around the top, was folded, as indicated in Fig. 6. for a gimp, or binding, and nailed in place with brown upholsterer's nails which matched the covering. The legs and rails were sandpapered, given a coat of brown stain, and waxed. Thus one piece of useful furniture was made from two pieces which were of no value.



A Useful and Attractive Upholstered Footstool can be Made from Two Pieces of Worn-Out Furniture

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A Watch Charm for the Draftsman

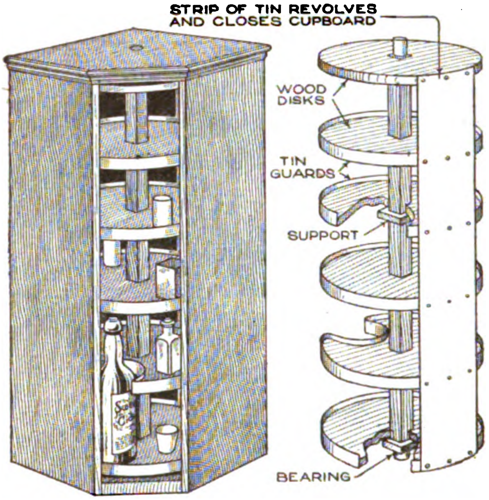
A watch charm symbolic of the wearer's occupation is universally prized. The one described can be easily made by the draftsman, and will present a neat appearance. The next time a corner is broken from a celluloid triangle, file the broken edge of the small piece straight to form a smaller triangle, cutting out the center by drilling a hole and filing to shape. A small hole should be drilled in one angle so that the charm may be hung on the watch chain. The triangle may be left plain, or, if preferred, may be roughened up with fine sandpaper, and colored with India ink.

To Keep Flowers from Wilting

The life of cut flowers may be lengthened considerably by dipping their stems into melted candle wax, after they have been in water for several hours. When a small knob of wax has formed on the end of the stem, it will keep them from wilting for some time, even if kept out of water after treatment.

A Cupboard with Revolving Shelves

Corners are often made useful by having shelves or cupboards built in them. They may be made still more useful, and more attractive, if the cupboard installed has revolving shelves, for in that case the shelves may be larger, without increasing the difficulty of reaching an object. The dimensions can be made to fit the room. A number of wooden disks are mounted on a vertical axle, being supported by small wooden cleats. Around the circumference of each shelf is tacked a strip of tin, to keep the articles on the shelf from falling off when the shaft is revolved. A strip of tin, a little wider than the opening in the case, is nailed to one side of the shelves to close the opening. The case may be made of any wood, finished in a simple varnish stain. The shaft upon which the shelves are supported fits into holes bored in the top and bottom of the case.—Dale R. Van Horn, North Loup, Nebraska.



A Cupboard with Revolving Shelves Makes a Roomy, Accessible Piece of Furniture Which can be Placed in the Corner, Out of the Way

Preventing Frayed Negatives

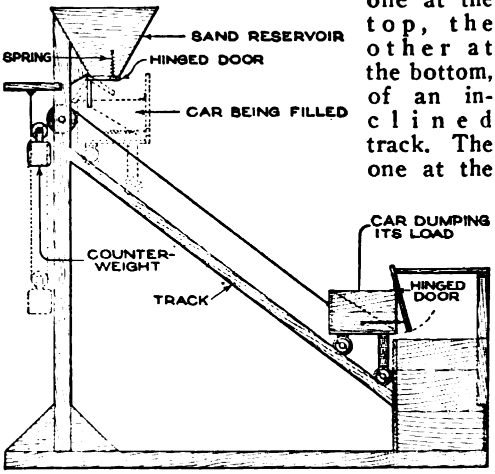
When developing plates, especially in hot weather, nearly every photographer has his difficulties with frayed negatives—that is, having the emulsion split away from the glass and become frayed or ragged along the edges. Often the resulting pictures are thus ruined. This may be avoided, in most cases, by rubbing the edges of each plate with tallow or paraffin, such as a candle affords, before it is dropped into the developer. The coating of wax or tallow thus deposited, seals the emulsion to the glass. It prevents the chemicals from working in between the emulsion and the glass, doing away with frayed edges and blisters of the emulsion. This remedy will be found effective even in very warm weather, when ice in the developing solution is not available. Its value to the photographer will be in proportion to his normal losses from frayed or blistered negatives.

Rubber Stamps Cut from Squeegees

Men in the naval service have occupied some of their spare time cutting rubber stamps to print their names, from pieces of worn-out squeegees or window cleaners. A portion of the wooden part of the squeegee is cut out with the section of rubber, and, when carved to a convenient shape, becomes a mounting for the rubber stamp. Large letters are used, since they are easier to cut.

Automatic Sand-Hoist Toy

A toy which automatically takes sand from one reservoir and places it in another is interesting to make, and pleases boys who like to "see the wheels go 'round." Since the dimensions can be changed to suit the builder, only the principle upon which the toy operates is given, the dimensions being easily worked out. There are two reservoirs required, one at the top, the other at the bottom, of an inclined track. The one at the top has a hinged bottom, held in place by a spring or rubber band until a piece fastened to it is pushed by the car, when



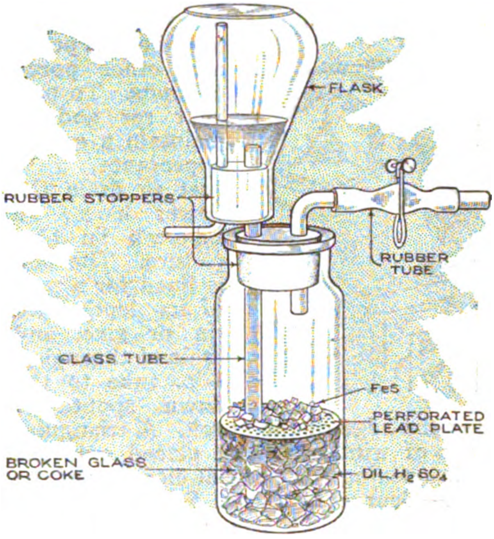
An Automatic Sand-Hoist Toy Loads and Dumps a Car as Long as There Is Sand in the Upper Reservoir

it opens and dumps sand into the car. When the car with its load is heavier than the counterweight, it will slide down the track. As soon as the trigger on the bottom of the upper reservoir is released, the spring or rubber band pulls the bottom up. When the car reaches the bottom of the track, it bumps into a stick which presses back on the upper part of the hinged car front, opens it, and allows the load to slide out. This hinged front is kept shut by a spring, or rubber band, except when opened by the bumper on the lower reservoir. When it is empty, the counterweight, which is heavier than the empty car and lighter than the full car, pulls it back up the track. The car has a slanting bottom to make the sand slide out easily. When properly built, the toy will automatically load and dump the car as long as there is sand in the upper reservoir. The toy will furnish many hours of pleasure to the boy who takes the pains to make it.

A Hydrogen-Sulphide Generator

The amateur's laboratory need not be without an automatic hydrogen-sulphide generator, the one illustrated being simple and quickly put together. A two-hole rubber stopper in the wide mouth of a gas bottle is provided with two glass tubes. One is a long straight tube, extending from the bottom of the bottle up through the stopper and into another two-hole stopper in the neck of a flask. A short, right-angled glass tube from the second hole in the gas-bottle stopper is connected to a glass delivery tube by a piece of rubber tubing, upon which there is a pinchcock clamp. The bottom of the large bottle is filled with broken glass or coke, and on it rests a perforated plate of sheet lead. On top of this plate is a small quantity of ferrous sulphide (FeS). A tube with a right-angle bend extends from the bottom of the flask, through the second hole in the stopper.

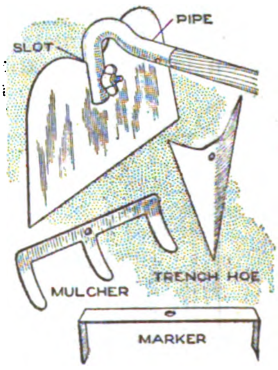
When the sulphuric acid (H_2SO_4) comes into contact with the ferrous sulphide, it liberates hydrogen-sulphide gas (H_2S), which may be collected by means of a pneumatic trough, or in any other convenient way. When the pinchcock on the rubber tube is closed, preventing the escape of the gas, this creates pressure in the bottle, forcing the sulphuric acid down in the bottle, out of contact with the sulphide, and up into the flask. This stops the generation of the gas. When the pinchcock is released, allowing the gas to escape, the pressure in the bottle is diminished so that the sulphuric acid is allowed to flow, again reaching the sulphide and thus generating more gas. Since the action is automatic, it is well to leave the pinchcock closed while changing the bottles in which the gas is collected. —Edw. H. Fackenthal, Easton, Pa.



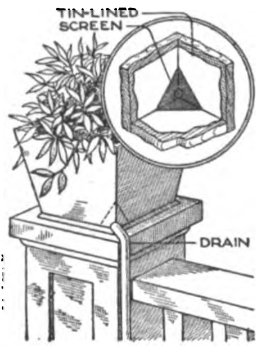
A Simple Hydrogen-Sulphide Generator, Which can be Put Together in the Amateur Laboratory, Is Automatic in Action

Homemade Repair on Hoe Serves as Combination Tool

When one gardener had the misfortune to break his hoe just back of the blade, the ingenious way in which he repaired it made it into a tool more useful than before. He bent a piece of pipe to the shape shown, fastened the handle firmly with a pin, drilled another hole, sawed a slot, and fastened the blade with a bolt and wing nut. Blades were then made of various shapes, any one of which could be fastened in the same slot in the piece of pipe. Thus one tool did the work of three or four.—Elmer O. Tetzlaff, Cicero, Ill.



Nonrotting Flower Box for Porch Post

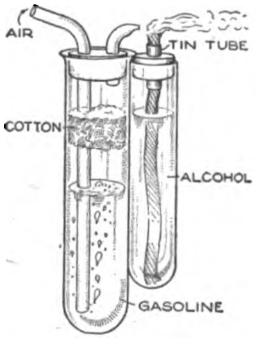


The home mechanic is often called upon to build flower boxes to place on top of newel posts, and other porch columns. To prevent rot and to maintain a good appearance, it is best to drain the flower box, as shown in the picture. The box is lined for a part of its depth with tin or zinc, and drained through a 1-in. tube to the down spout, or over the edge of the porch. A triangular piece of window screen placed over the drain opening will prevent clogging of the pipe.—George L. Furse, St. Louis, Mo.

Stovepipe Makes the Bird House Cat-Proof

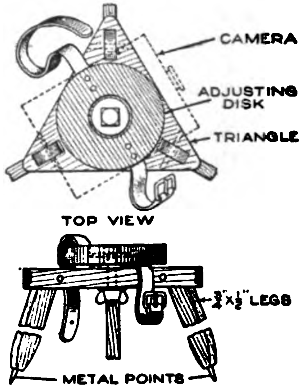
Many persons set a bird house on a tall pole in the garden. To protect the tenants, cut a piece of stovepipe open, and tack it around the pole about 6 ft. from the ground. Cats will be unable to climb past the pipe, because their claws will not catch on the metal.—Sylvanus Van Aken, Port Ewen, N. Y.

An Improvised Blowtorch



A chemist, having use for a more intense flame than the apparatus in his small laboratory afforded, constructed a blowtorch from materials at hand. As shown in the illustration, one test tube, of a suitable size, was half filled with gasoline, and was stoppered with a two-hole rubber cork, in one hole of which was a glass tube, passing through a wad of cotton, and extending to the bottom of the test tube. Through the other hole was a tube terminating in a jet, and bent, as shown. A smaller test tube was fastened to the first with tire tape, and fitted with a wick, passing through a tin collar placed in the cork. This tube contained alcohol. As the air was blown through the mouth tube, it passed through the gasoline, and gasoline vapor was blown across the alcohol flame, where it ignited and produced a very intense heat. A moth ball (naphthalene) dissolved in the gasoline greatly increased the resultant heat.—Raymond D. Harris, Opportunity, Wash.

A Tripod for Small Cameras



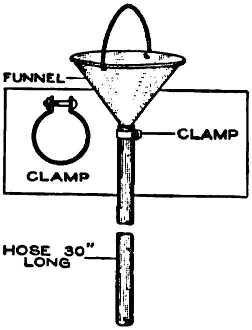
The great majority of photographs taken by amateurs do not, of course, require time exposures, and, for snapshots, it is entirely satisfactory to hold the camera in the hand. Quite often a tripod comes in very handy, but the high price of those to be found on the market often prevents the amateur from owning one.

The sketch shows a tripod which will take any kind of camera, either the box or folding type, which has a flat bottom on which to rest. The camera is held by the leather strap to the revolving disk, which can be clamped in place by means of the wing nut below. The disk is mounted on a triangular piece of wood, 1 in. thick, in which three slots have been chiseled out, to take the three legs. These should be about 4 ft. long and may have iron rods clamped along them, in order to vary the length, if desired. The tripod will, however, be found quite useful without this feature. The legs are prevented from swinging out too far by coming against the wood of the triangle, and if a stronger fastening is desired, all three may be tied together with twine.

Screws Started in Inaccessible Places with Wooden Stick

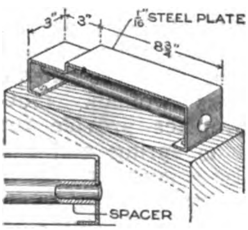
A simple kink for starting a screw in an awkward place is to whittle out a piece of wood so that it can just be driven into the slot of the screw. If the slot is clean and of a standard depth, the stick can be made to fit tightly enough to hold the screw while it is being started into the hole. As soon as the screw is turned hard enough to test the strength of the wooden stick, it can be pulled out, and an ordinary screwdriver used to force the screw home. —H. S. Hart, Shreveport, La.

Bean Planter Saves Stooping



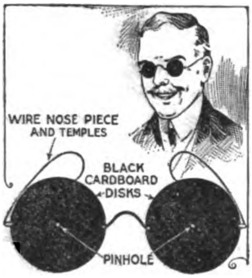
The planting of beans and corn is tiresome work, as there is much stooping required. Since it is impossible to stand upright and drop the seed accurately by hand, the planter described will prove of service. A funnel, large enough to allow the beans, or corn, to pass through it, and a piece of old garden hose are required. The funnel is fastened to the hose with a clamp, as shown. A wire handle may be added. To use the device, stand beside the row with the end of the hose about an inch from the bottom of the seed trench. Drop the seeds one at a time in the funnel, moving the planter the distance required to space the seeds. This planter allows the one using it to walk upright and at the same time drop the seed accurately, thus accomplishing the work more easily and in less time.—George Perkins, Millburn, N. J.

Simple Iron Foot Rest for Shoe Polishing



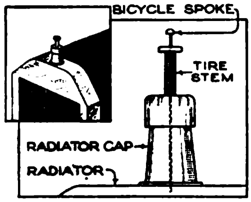
A metal rest for the foot while polishing shoes can be made from a piece of sheet iron, 2 or 3 in. wide, a piece of pipe, and a rod which fits inside of it. The sheet iron is bent to the shape shown, holes are drilled and countersunk in the ends, just large enough to take the iron rod, and it is inserted with the pipe as a spacer. The ends of the rod are riveted into the countersunk holes and the foot rest is complete. It can be mounted on a wooden block, if preferred. —F. H. Mason, San Diego, Calif.

Efficient Cardboard Spectacles



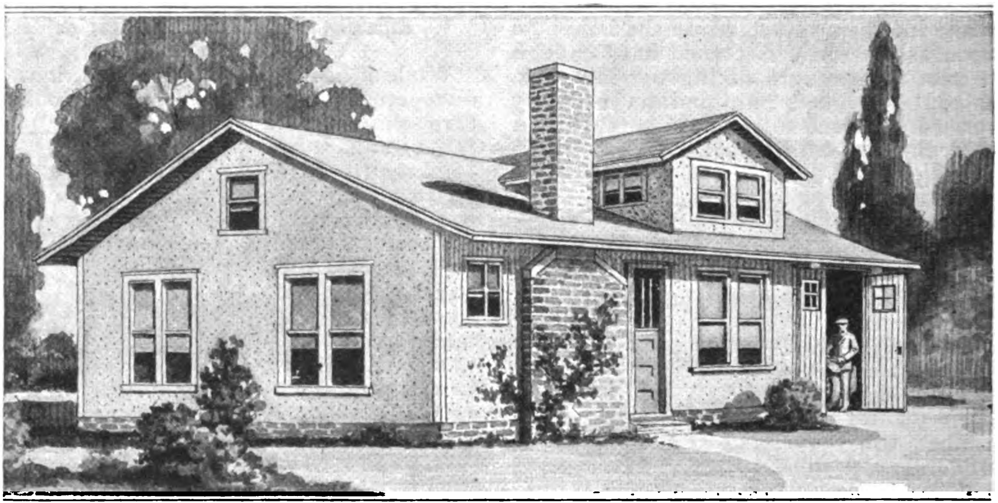
While making a pinhole camera, it was discovered that when the observer looked through a pinhole in a square of blackened cardboard, with one eye, he was able to read a small sign across the street. A pair of spectacles was made, as an experiment, using lenses of blackened cardboard, with pinholes punched in them. Great care was taken in punching the holes to get them spaced to the exact distance between the pupils of the eyes. Wire was used for the temples and the nose piece. When completed, the spectacles proved to be very efficient, the principle involved being the same as that in stopping down the lens of a camera to secure greater definition. By making the holes in the cardboard larger, these spectacles can be used to protect the eyes from glare on a very bright day. They are particularly handy to have on a fishing trip when the sun flashes on the water.

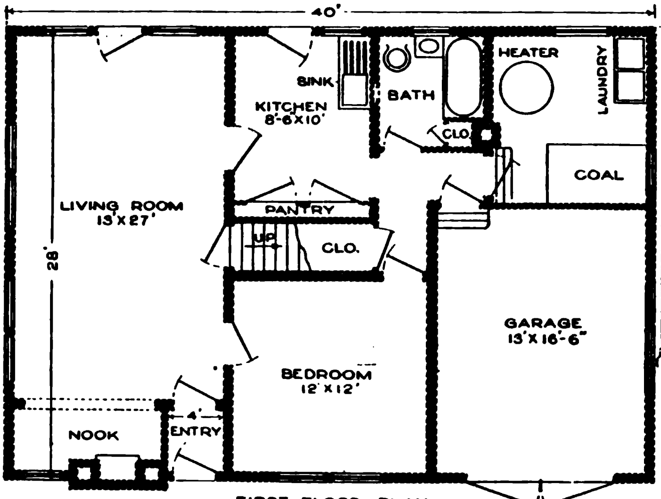
Safety Valve for Auto Radiators



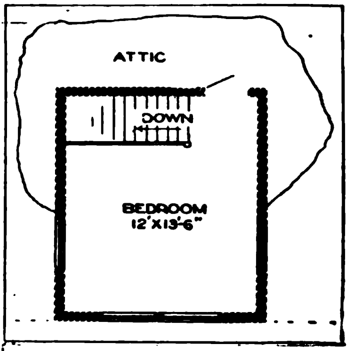
The owner of a light automobile, living in a mountainous country, had a great deal of trouble from the water in his radiator spilling out through the overflow pipe when going up or down hill or over rough places. He solved the difficulty by taking out the overflow pipe entirely, and providing a safety valve in the radiator cap to relieve any steam pressure which might be generated. He used a valve taken from an old inner tube, inverted and screwed into the radiator cap. The valve itself was removed from the stem, and a bicycle spoke cut off to the proper length, but with the head still on it, was dropped into the valve tube. This bicycle spoke acted as a check valve, keeping dirt from entering the radiator by permitting the steam to escape whenever its pressure was sufficient to lift up slightly the head of the bicycle spoke.

COMFORTABLE ALL-WEATHER WEEK-END COTTAGE





FIRST-FLOOR PLAN



DESIGNER, HERBERT A. SHEARER

The Combination Makes a Compact Structure Adapted to Meet the Modest Demands of a Two-Member Family Desirous of Building on a Small City or Town Lot. Likewise It is Suited for Week-End and Summer-Vacation Purposes in Suburb or Country

SIGNS of approaching spring bring up pictures of the summer cottage that is, perhaps, to be built some day. The accompanying plans, therefore, are a seasonable offering. Strictly, the cottage is an all-weather one, admirably adapted for the unfettered couple that cares to break away from the city apartment or hotel for a bit of a breathing spell in the open country whenever the spirit moves, be it summer or winter. It combines home and garage in one structure that may be "opened" or "closed" on brief notice. There is a living room, large enough for real comfort and, on the second floor, a spare chamber that permits the accommodation of a week-end guest on "occasions." The kitchen is compactly arranged and adjacent to the rear of the living room, so that the latter, at mealtime, may be used in lieu of a dining room. Thus the scheme considers the maidless woman. Hot-water heat and a fireplace provide for winter days as well as spring and fall weather. There is also a laundry. Modern plumbing and electric wiring complete the equipment. The structure may be erected for about $2,000.

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May

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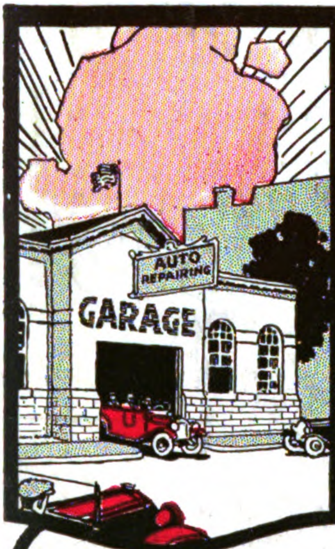

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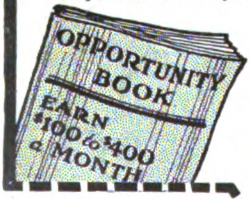

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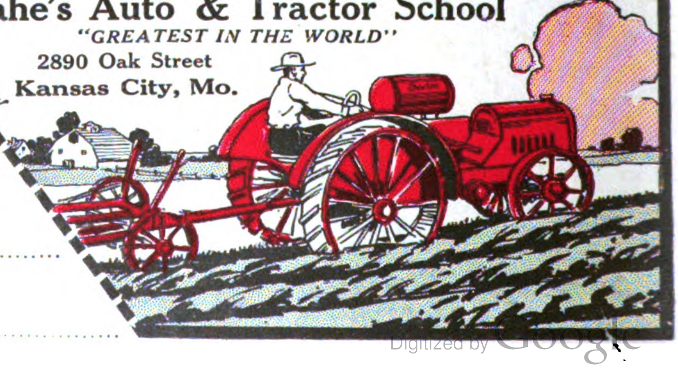

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Popular Mechanics Magazine

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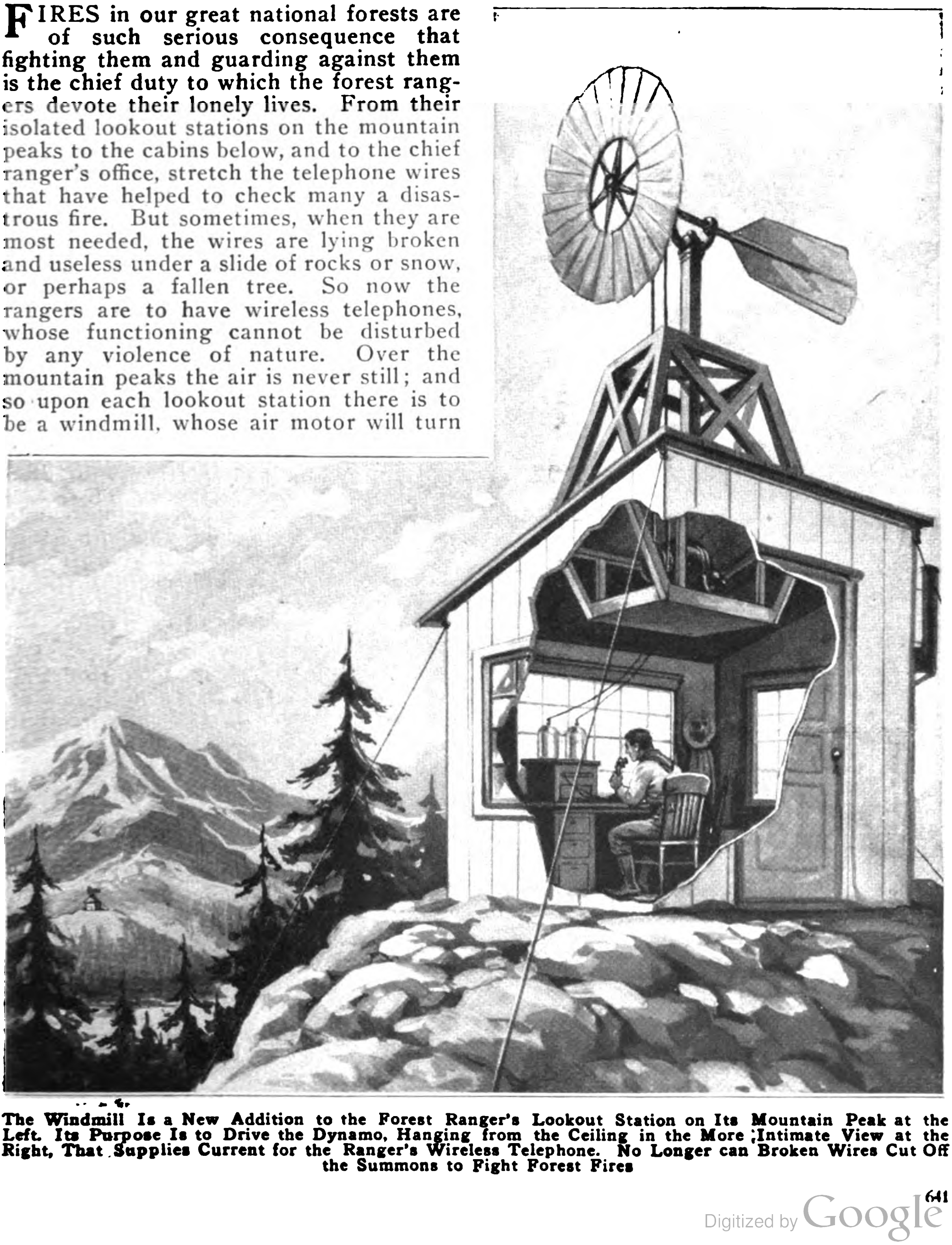
Vol. 31 MAY, 1919 No. 5

Radio Telephones to Report Forest Fires

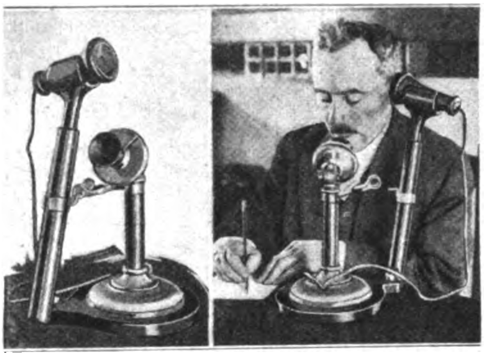
FIRES in our great national forests are of such serious consequence that fighting them and guarding against them is the chief duty to which the forest rangers devote their lonely lives. From their isolated lookout stations on the mountain peaks to the cabins below, and to the chief ranger's office, stretch the telephone wires that have helped to check many a disastrous fire. But sometimes, when they are most needed, the wires are lying broken and useless under a slide of rocks or snow, or perhaps a fallen tree. So now the rangers are to have wireless telephones, whose functioning cannot be disturbed by any violence of nature. Over the mountain peaks the air is never still; and so upon each lookout station there is to be a windmill, whose air motor will turn



The Windmill Is a New Addition to the Forest Ranger's Lookout Station on Its Mountain Peak at the Left. Its Purpose Is to Drive the Dynamo, Hanging from the Ceiling in the More Intimate View at the Right, That Supplies Current for the Ranger's Wireless Telephone. No Longer can Broken Wires Cut Off the Summons to Fight Forest Fires the shaft of an electric generator mounted just under the roof. In the room below, two vacuum tubes and the necessary complement of condensers and coils will convert the dynamo current into high-frequency waves, whose telephonic modulations will radiate into space from the surface of short copper-wire antennæ, to be instantly picked up, with their report of "all's well" or their call to vigorous action, at every cabin in the district.

SIMPLE HOLDER FOR PHONE RECEIVER

A sturdy holder for a telephone receiver has been produced which is of some practical value. The quickly adjustable, telescoping arm is hinged to a detachable wooden base, permitting movement of the receiver to any desired position. When conversation is finished a slight inclination of the hinged arm causes a projection to engage with the receiver hook, thus breaking the circuit. Made with a bracket the attachment is adaptable also to wall telephones.



When Not in Use This Telephone Accessory is Pushed Back, Breaking the Circuit as Shown

ℭA late addition to the list of fliers downing five or more German planes makes American aces 64 in number.

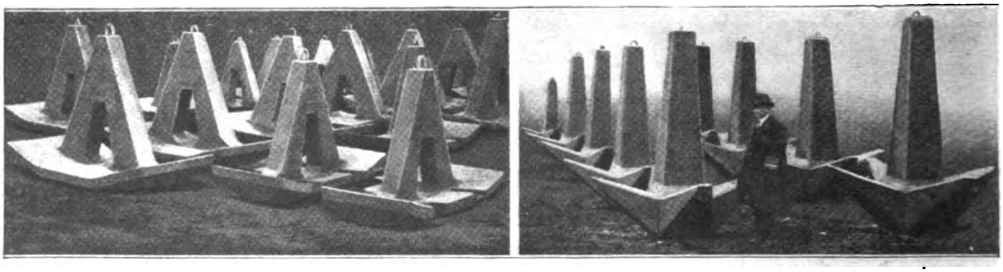
STONE BRIDGES TORN BY WAR REBUILT WITH CONCRETE

Many of France's old railroad bridges of masonry, destroyed by war, are to be rebuilt with concrete. Lack of timber for constructing centering scaffolds is one reason for adopting the new material. In one reconstruction method already used, the concrete arch was cast in sections in a horizontal mold. These sections, each 15¾ in. wide and 32 ft. 10 in. long, weighed about 22,000 lb. By protecting the arch with a tie-rod and lifting at calculated points, they were transported to the bridge site without difficulty. Concrete keys tied them to the abutments as they were swung into place, 20 sections being used to make the complete arch, which was 26 ft. 3 in. wide with a span of the same dimension. A concrete deck covering the whole structure finished the bridge.

CONCRETE ANCHORS PROVE SERVICEABLE

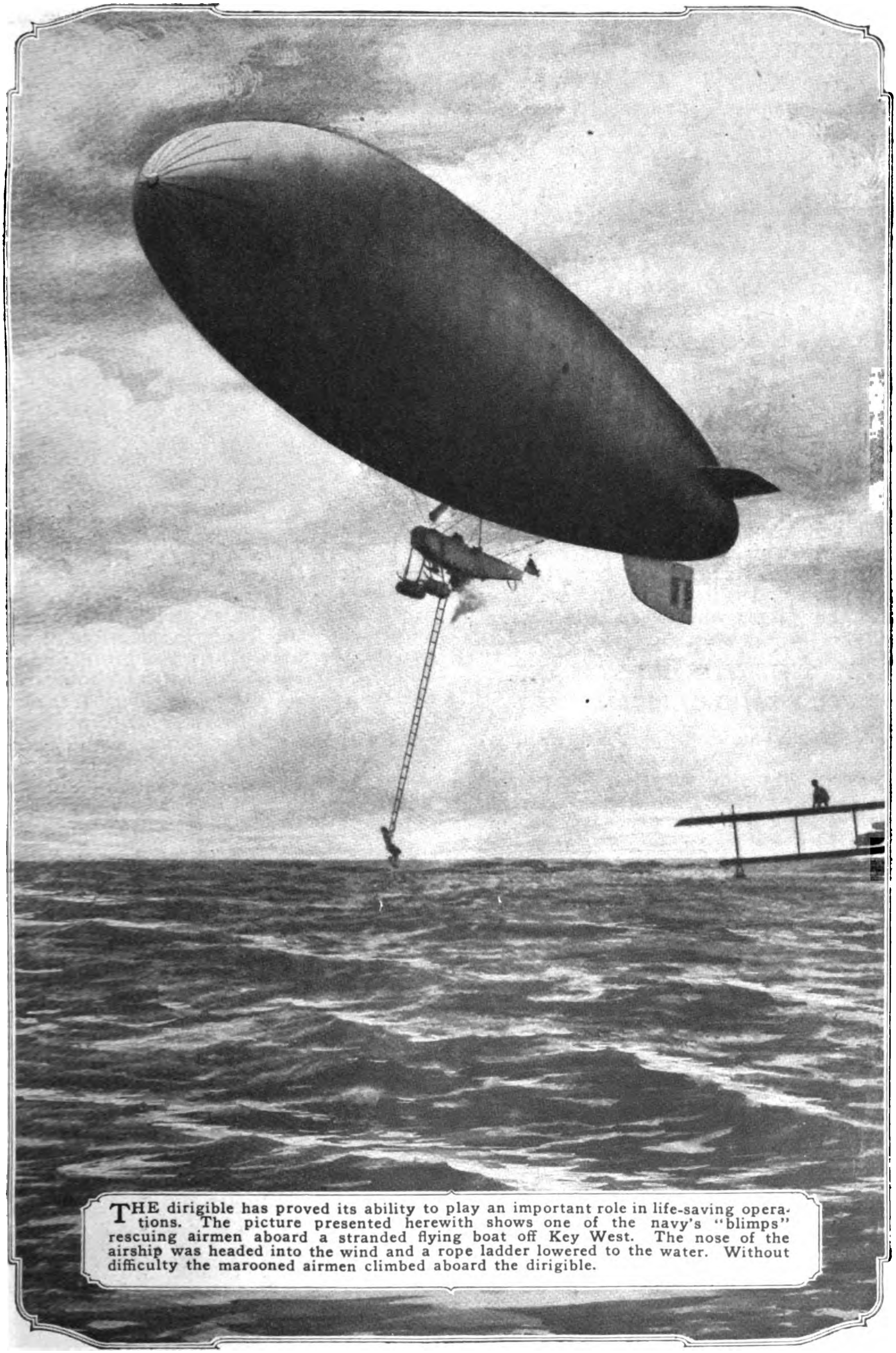
Concrete anchors are the logical successors to the concrete ship, and seem to be equally practical. Made of reinforced concrete, they are claimed to possess several advantages over the traditional type. Initial cost is very low, making loss of an anchor in a storm a less serious matter than before; and upkeep is practically nothing, since they will not rust nor corrode, and hence never need chipping or painting.

There are two kinds now being manufactured: a slab type, for barges, and a fluke type, used for floating fish traps. Neither looks very acceptable to a sailor, but the latter most nearly resembles the familiar steel anchor, having regulation steel-capped flukes, with edges beveled and surfaces smoothed. These anchors are now being produced in large quantities, in sizes ranging from 500 to 8,000 pounds.



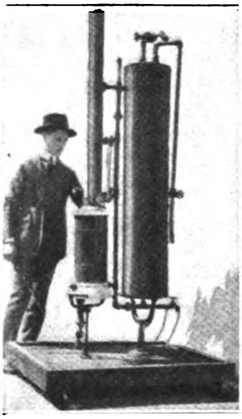
The Concrete Anchors on the Left Are of the Slab Type for Use on Barges. Those on the Right More Nearly Resemble the Familiar Metal-Fluke Type

"BLIMP" MAKES SPECTACULAR RESCUE AT SEA



THE dirigible has proved its ability to play an important role in life-saving operations. The picture presented herewith shows one of the navy's "blimps" rescuing airmen aboard a stranded flying boat off Key West. The nose of the airship was headed into the wind and a rope ladder lowered to the water. Without difficulty the marooned airmen climbed aboard the dirigible.

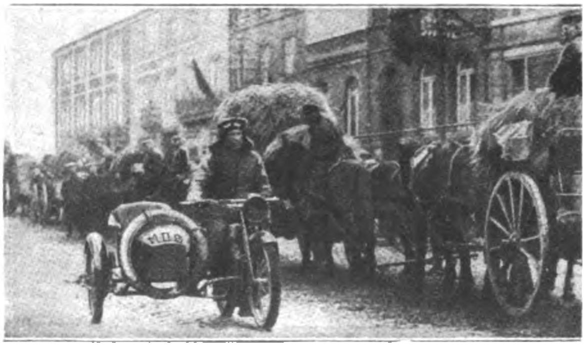
PORTABLE HOT-WATER PLANT SUPPLIES STEAM EFFECTS



Every movie goer is familiar with kitchen-comedy scenes, where hot water and clouds of steam are lavished on the principals. In the past, studio managers have used the household teakettle to secure these effects, but have found it cumbersome and inadequate. To remedy this a prominent film company has improvised an efficient portable hot-water outfit, consisting of an ordinary gas heater and boiler mounted on a movable platform, on which it rolls to various parts of the studio. Numerous gas jets about the plant and a long rubber hose insure a supply of gas whenever needed.

IS THIS THE FIRST YANK TO REACH GERMAN SOIL?

A German photographer has taken the trouble to show us a number of his retreating countrymen. They are evidencing a pardonable interest in what is claimed by a sergeant in a dispatch company with the American army of occupation to be the first American on German territory. The photo was snapped on Nov. 12, 1918, and was purchased by an American soldier with an eye for historical interest, several days later, at a German photo shop.



Beaten Germans on Their "Triumphal" March to Berlin Pause to Inspect an Unconcerned Yank

RADIUM-BEARING ORE SUPPLY STILL ADEQUATE

Reported depletion of American carnotite fields in Colorado and Utah has caused apprehension among refiners of this valuable radium-bearing material. It has been suggested that mesothorium, a by-product of monazite. be substituted for radium both for medical purposes and in the manufacture of luminous materials used on the face of watches and other instrument dials. However, recent investigation seems to disprove the alleged shortage, claiming that 500 grams of radium can still be produced from available carnotite. And against the use of mesothorium it is asserted that it is available only in small quantities, that it must be aged for a year or more before using, and that its short life and varying activity make it undesirable for medical use.

CHINESE OFFICIALS BURN FORTUNE IN OPIUM

Hundreds of cases of opium, reported worth their weight in gold, were lately burned by the Chinese government to prevent the attempted resumption of the trade. From the Shanghai warehouses of the dealers the drug was ferried across the river, under guard, and the sticky mass was fed to four furnaces and carefully raked into the flames. Precautions were taken to make sure that none of the stuff remained, even the rakes being withdrawn only after prolonged burning.

BIRD RECORDS ON PHONOGRAPH BRING UNSAVORY VISITORS

An unintentional parody on the sport of luring seals with phonograph music, as related in the March number of Popular Mechanics, was played in the Michigan woods last summer. In this case, however, the "sport" element was not apparent until time had softened the recollection. A cottager from Chicago, fond of birds, set his phonograph on the bungalow porch to playing records of bird songs. Soon visitors began arriving from the woods — pretty black and white kitties, in ever-increasing numbers. Skunks are very fond of birds' eggs, and not afraid of anything. Naturally the concerts were discontinued.

CONCRETE MERCHANT SHIPS
Will They Drive Steel Vessels from the Sea?

Their Singular Status in the Dark Days of War: Their Chance of Development in Time of Peace

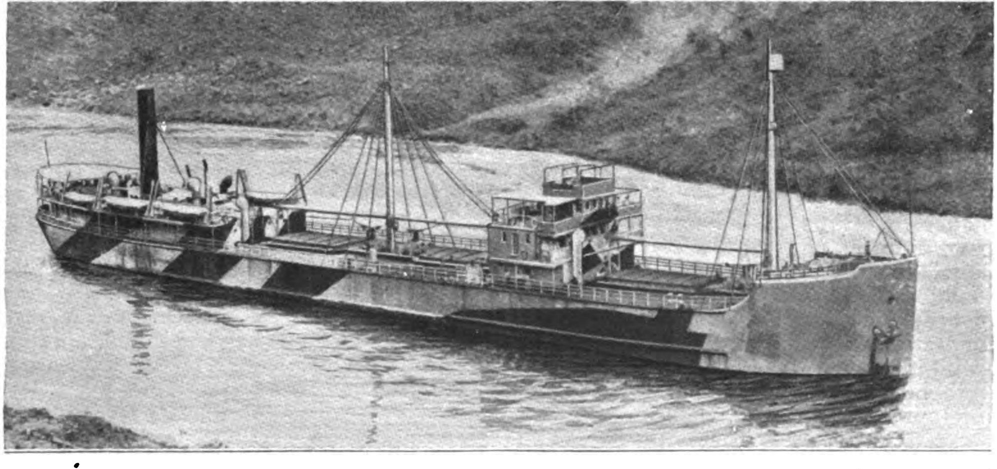
By Searle Hendee

Presenting a Bird's-Eye View of the Concrete-Shipbuilding Yard at Brunswick, Georgia, Where the First of the Government's Stone Freighters, the "Atlantus," was Recently Launched

WAR was the mother of the concrete ship. War is dead and its unweaned offspring an orphan. Peace, before long, will be the foster parent.

A civil, rather than a military, court henceforth has jurisdiction. The fate of the stone ship will be determined on the unsentimental basis of cold dollars and cents. If it can give convincing proof of superior commercial merit, it will be nourished and permitted to develop. Otherwise, it is doomed to a natural and deserved death.

At the outset let it be said, however, that the concrete ship has a "case." To all appearances it has considerably more than a fighting chance for survival and a promising career. Already its seaworthiness, when properly constructed, has been conclusively demonstrated by the commendable performance of the "Faith," and certain other vessels in this and other countries. Furthermore, it has shown itself to be possessed of inherent advantages of recognized value. The factor that will largely govern its peace-time usefulness,



Carrying a General Cargo, the Concrete Ship "Faith" Passing through Gaillard Cut, Panama Canal, en Route from New York to Valparaiso: The Seaworthiness of the Stone Hull has been Conclusively Demonstrated by This Vessel, Which Has Weathered Heavy Storms and Traveled Thousands of Miles during the Past Year however, will be the measure of ability with which it competes with the steel cargo carrier. If it succeeds in doing this profitably, and there is reason to believe it can, it will have its place in the sun.

Had hostilities been of longer duration, the concrete ship undoubtedly would have risen on the wave of world emergency to a position of war-time importance at least. The armistice was a severe setback to mushroom development. Progress from now on obviously will lack the stimulus of war and depend on the slower-ripening fruits of peace-time pioneering.

Only a few months ago the concrete ship occupied a peculiarly dramatic position. It offered a possible means of turning the tide of war when the Hun was destroying tonnage faster than the allies were building it. The admitted need of new bottoms far exceeded the possible maximum output of our steel and wood shipbuilding yards. It was imperative that we have ships, and more ships. And it mattered not—except perhaps to certain prosperous interests—whether they be of wood, or steel, or concrete, or oilcloth, so long as they were ships capable of immediate production in large numbers and of a type able to carry men, supplies, and food overseas.

The question of the most ideal and commercially profitable ship was not for a second involved. The whole problem was one of increasing tonnage by making use of every resource at our command, and doing so without wheezing and sputtering.

After exhaustive scientific investigation, the United States Bureau of Standards reported that reinforced-concrete ships could be built "structurally equal to any steel ship." Labor, materials, and equipment for their construction were apparently available without interfering with the wood and steel programs.

But what happened? At every turn obstructions were placed in the path of the concrete ship. It was not given a fair chance to demonstrate its worth. When after months of public and congressional hammering, the Shipping Board finally ordered the establishment of five government concrete-shipbuilding yards, counteraction was immediately taken by prohibiting private construction of concrete hulls. Thus all chance of outside development, at a time when independent interests were manifesting enthusiasm and real progress was to be expected, was effectively blocked.

Just as soon as the concrete division completed plans for a 3,500-ton vessel, the Shipping Board condemned the size as uneconomical and, for a time, tabooed its production. Yet contracts for wood and steel ships of the same size continued to be awarded throughout the year. When the public was being told that concrete ships would be built in quantity if only it were possible to obtain propelling machinery for their equipment, manufacturers who offered to provide this self-same propelling machinery were told that none was wanted. When the "Faith" was chartered to the British ministry for carrying a cargo from New York to Liverpool at $150 a ton, its sailing was prohibited. When foreign interests, with $60,000,000 cash in hand, wanted $100,000,000 worth of concrete ships built in America by private constructors, the contract was forbidden by the Shipping Board. As quickly as the armistice was signed, the Shipping Board cut the concrete-ship program from 42 to 14 vessels. At the same instant, however, the public was asked to pay for charging off as a "war loss" $1,000,000,000 for steel ships, many of which had not been built.

Pages upon pages of other significant items might be tabulated. But the war is won. Democracy is no longer at stake. The concrete ship ceases to be of importance except in a possible commercial capacity. Other things than past opposition to its development must be considered if its peace-time possibilities are to be analyzed.

First of all, we are assured by the Bureau of Standards that the concrete ship can be built structurally equal to the steel ship. We have seen the "Faith" pass through severe tropical storms that have sunk other ships, and arrive in perfect condition at New York after completing a 12,000-mile voyage. Stanchness and seaworthiness have been conclusively proved. But what special utility has the concrete vessel that is not already equally provided by the steel ship? What of its cost, its cargo-carrying efficiency, its life, speed, and special features?

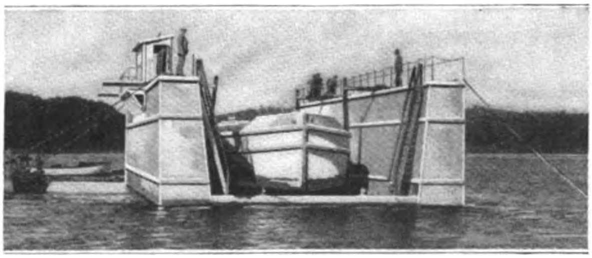
It may surprise some persons to be told that the concrete ship is a bone-dry ship. The "Faith," for instance, has never once used its pumps. It has had no bilge water. The interior of a concrete vessel does not "perspire," as does a steel boat, and it has no leaky seams. This feature adapts it particularly for carrying cargoes that are easily affected by moisture.

Concrete is a nonconductor of heat and cold. In the tropics it has a distinct ad-

The First Reinforced-Concrete Barge Completed for the Government's Use in the New York State Canal, a 150-Foot Vessel with Cargo Capacity of About 500 Tons: Many Concrete Barges Are Now in Use

vantage, for, when exposed for long hours to the intense rays of the sun, it does not become a veritable bake oven. The hull, because of its composition, requires no special protection when cargoes that a steel ship handles with difficulty are carried.

Timber rots and iron corrodes. Concrete improves with age. Insects do not attack it; bacteria, mold, and vermin are not supported by it. Cleaning is easily accomplished, and painting is unnecessary. A ship built of concrete has no maze of seams to be calked. It is monolithic and rivetless. Steel vessels, every two years or so, go into dry dock for thorough cleaning, painting, and overhauling. This expense must be charged to maintenance. The life of a concrete vessel is not a subject of definite knowledge at the present time, but it is a matter of general knowledge that concrete itself has greater permanency than either wood or steel.



There Is Considerable Reason for Expecting That for Some Months to Come Concrete Barges, Lighters, and Car Floats will Be in Greater Demand than Large Concrete Ships. The Picture Herewith Shows a Concrete Barge in a Concrete Floating Dry Dock

The concrete ship is entirely free from the heavy vibrations that make the steel ship tremble from stem to stern. For this reason it offers a distinct advantage as a passenger carrier. In speed it is as fast as, and possibly may be made faster than, other vessels. One reason for this is that it has considerably less skin friction than a ship made of riveted plates. The fire risk is reduced to the minimum. Insurance charges will in all probability be greatly to its advantage because of lower investment of capital. Furthermore, it is asserted that the war proved the concrete ship will remain afloat if torpedoed.

Two items of particular importance are initial cost and upkeep. It has repeatedly been stated by those able to speak with authority, that concrete hulls can be built in quantity for a half or a third the cost of steel hulls of similar dimensions. Cost, however, is an element that has yet to be determined with certainty. The "Faith" offers no data because it was constructed under uneconomical conditions and as a private enterprise. The "Atlantus," the first government-built concrete ship to be launched, is understood to have been abnormally expensive, apparently due to construction methods, shiftless, inexperienced labor, lack of proper yard facilities, experimentation, and a combination of other circumstances, including its yacht-like design—which incidentally gives conclusive evidence that the lines of a concrete ship may be as graceful as those of a steel craft. Some of the other large vessels in the course of construction at government yards may soon furnish the much-wanted cost information, providing undue plant charges are not levied against them.

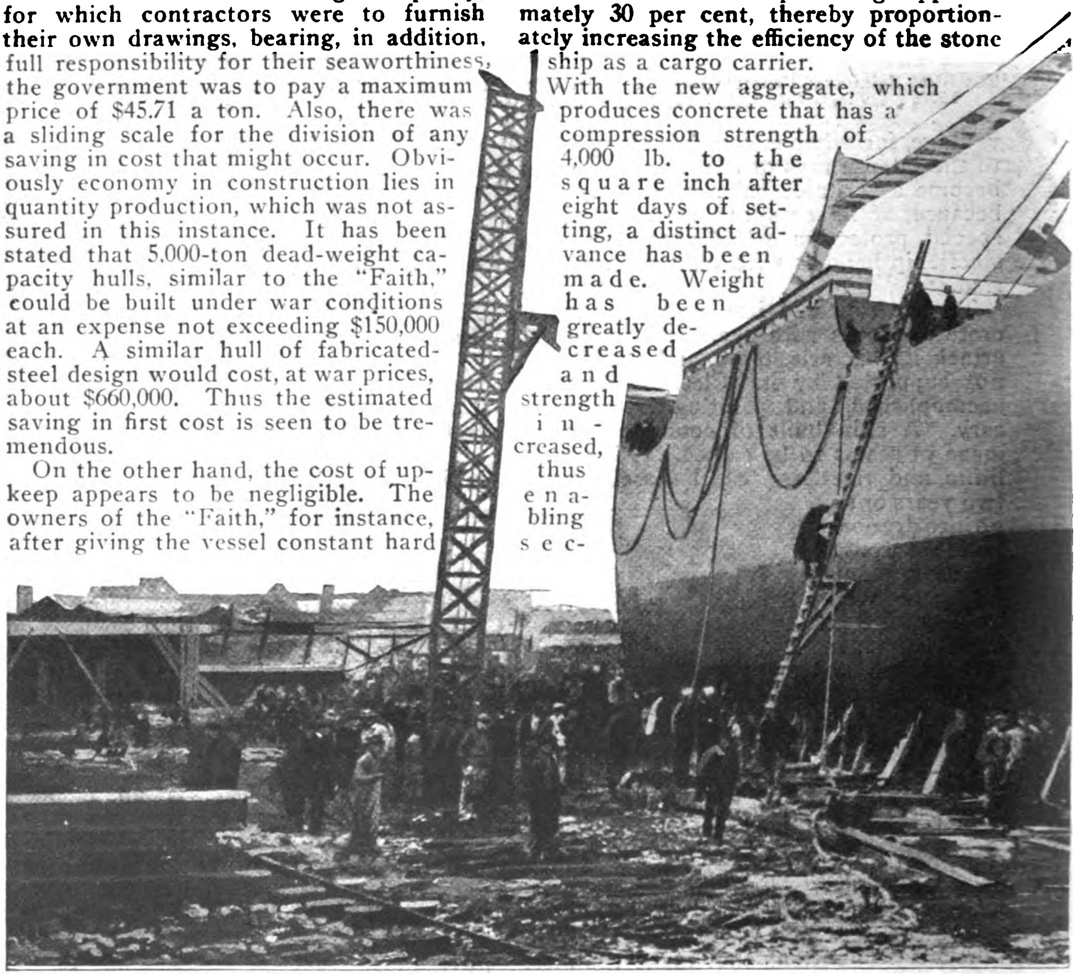
From $30 to $50 a ton has been set by some authorities as a reasonably safe estimate of the actual cost of concrete-hull construction. As further evidence, contracts entered into by the government some months ago might be cited. For hulls of 3,500-ton dead-weight capacity, for which contractors were to furnish their own drawings, bearing, in addition, full responsibility for their seaworthiness, the government was to pay a maximum price of $45.71 a ton. Also, there was a sliding scale for the division of any saving in cost that might occur. Obviously economy in construction lies in quantity production, which was not assured in this instance. It has been stated that 5,000-ton dead-weight capacity hulls, similar to the "Faith," could be built under war conditions at an expense not exceeding $150,000 each. A similar hull of fabricated-steel design would cost, at war prices, about $660,000. Thus the estimated saving in first cost is seen to be tremendous.

On the other hand, the cost of upkeep appears to be negligible. The owners of the "Faith," for instance, after giving the vessel constant hard use for a year, are understood to have charged nothing to this item.

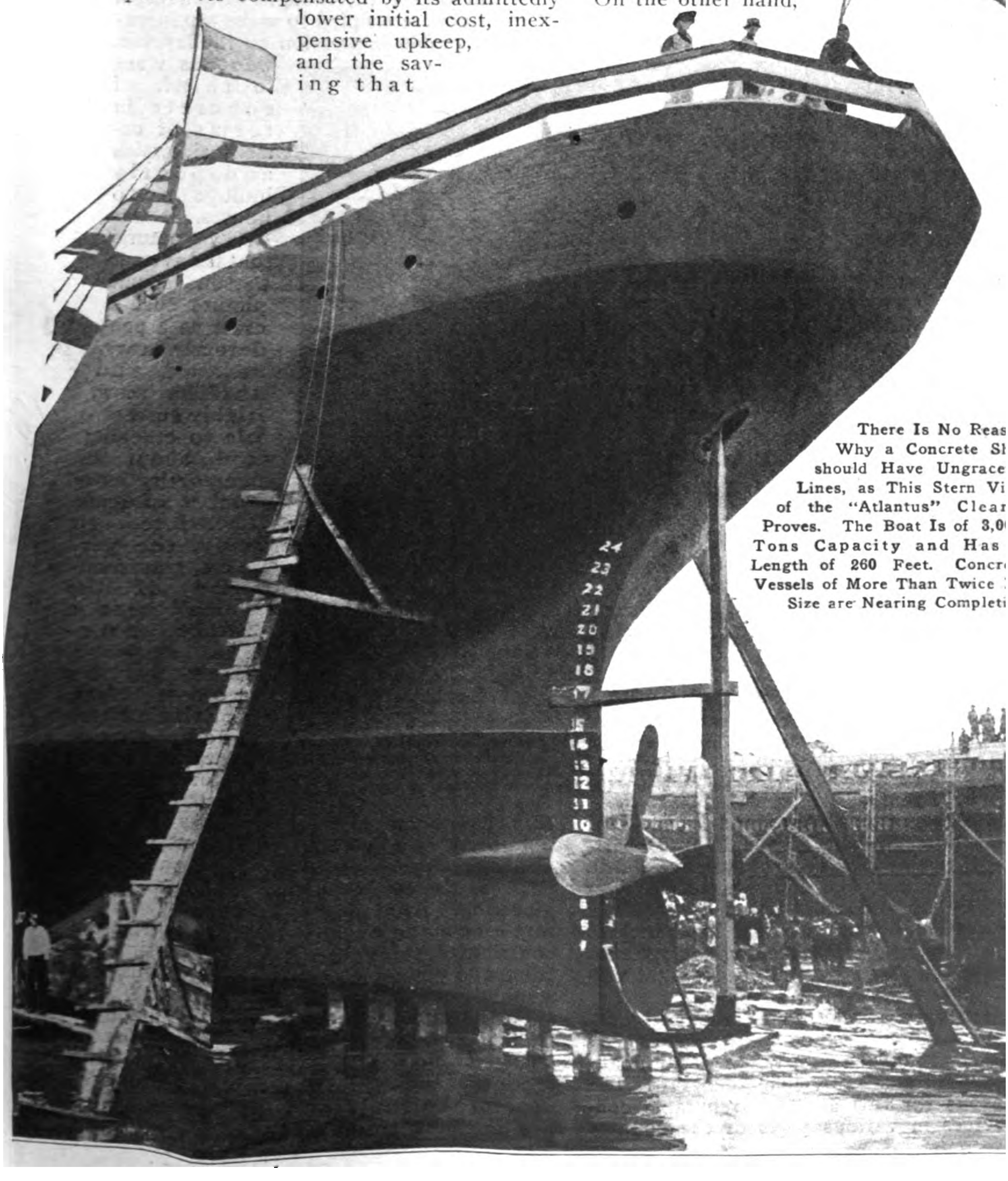
In competition with steel ships on a normal basis, the "Faith" will probably make a poor showing. It was built as an experiment by men unfamiliar with shipbuilding and is a heavy, crude-looking boat, although a most commendable "first attempt." It was built before the new light-weight concrete aggregate was developed, and without the benefit of the scientific work that has of late taught much about such construction. As a result, it in no way represents the ultimate in concrete boatbuilding, nor does it represent the present status of the industry.

The light aggregate, which floats on water, is produced by calcining certain shales or clays to a state approaching fusion. It is used instead of sand and crushed stone and reduces the weight of concrete used in shipbuilding approximately 30 per cent, thereby proportionately increasing the efficiency of the stone ship as a cargo carrier.

With the new aggregate, which produces concrete that has a compression strength of 4,000 lb. to the square inch after eight days of setting, a distinct advance has been made. Weight has been greatly decreased and strength increased, thus enabling sec-



tions to be reduced to practically one-half of what was considered necessary a year ago. Thus, in a few months, the concrete ship has been brought to a state of development that apparently enables it to compete successfully with the steel ship. Its cargo-carrying efficiency is still slightly behind that of its rival of similar size and design, but this disadvantage is to all appearances compensated by its admittedly lower initial cost, inexpensive upkeep, and the saving that will probably accrue throug lower insurance rates. The ca go-carrying efficiency of the modern concrete boat of 7,500 tons is placed at 61 or 62 per cent, as compared with 65 or 66 per cent for steel. On the other hand,



There Is No Reas
Why a Concrete Sh
should Have Ungrace
Lines, as This Stern Vi
of the "Atlantus" Clear
Proves. The Boat Is of 3,0
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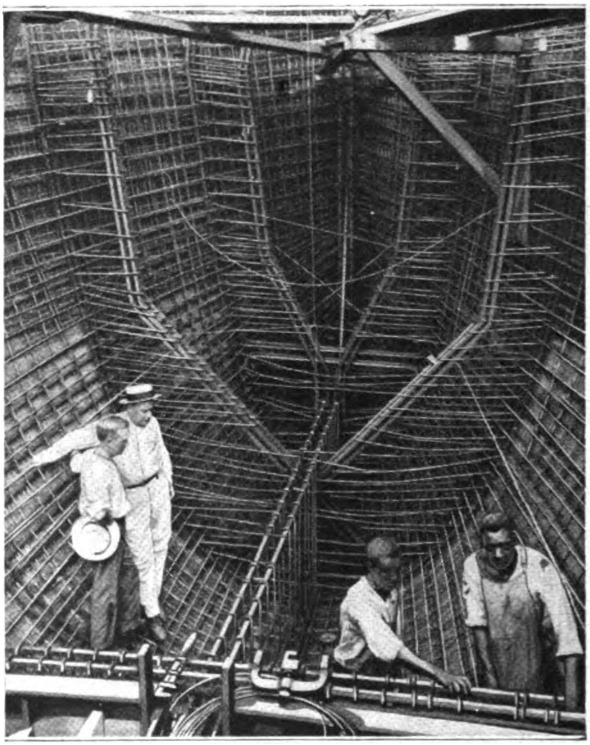
Length of 260 Feet. Concr
Vessels of More Than Twice
Size are Nearing Completi

designs have been completed for a 14,000-ton concrete ship with an estimated cargo-carrying efficiency of from 70 to 80 per cent! If practice proves that the engineers' calculations are correct, this boat, which is to be of unit construction, should surpass the steel ship in every economic particular. And right here it might be noted that the advent of successful unit construction will overcome the objection now raised because of inability to inspect a concrete hull prior to its completion.

The usefulness of concrete in boatbuilding seems to have practically unlimited range. That is, anything from a 16-ft. launch to a canal barge, and from a 500-ton tanker to vessels of large size, comes within its field. For the Emergency Fleet Corporation, as an example, ten 7,500-ton tankers and freighters, three 3,500-ton and one 3,000-ton freighters are building; for the Navy Department, eight 500-ton lighters; for the Railway Administration, twenty-one 500-ton canal barges, and for the War Transport Branch of the War Department, twelve 225-ft. car floats, five 100-ft. water tankers, and fourteen 130-ft. river boats. On the other hand, a successful concrete rowboat was built in France 70 years ago, and reputable engineers see no reason why a 25,000-ton dead-weight vessel could not be built at present.

It is very possible that the chief immediate demand for concrete vessels will center around barges, lighters, car floats, and other small miscellaneous craft. The reasons for this are that reputable contractors in various parts of the country are capable of constructing them satisfactorily; that they represent comparatively small investments, and that they have already demonstrated their merits. Even a 500-ton barge built of the now obsolete heavy concrete has been able to compete with a 600-ton steel barge of the same dimensions, and has shown practically the same profits.

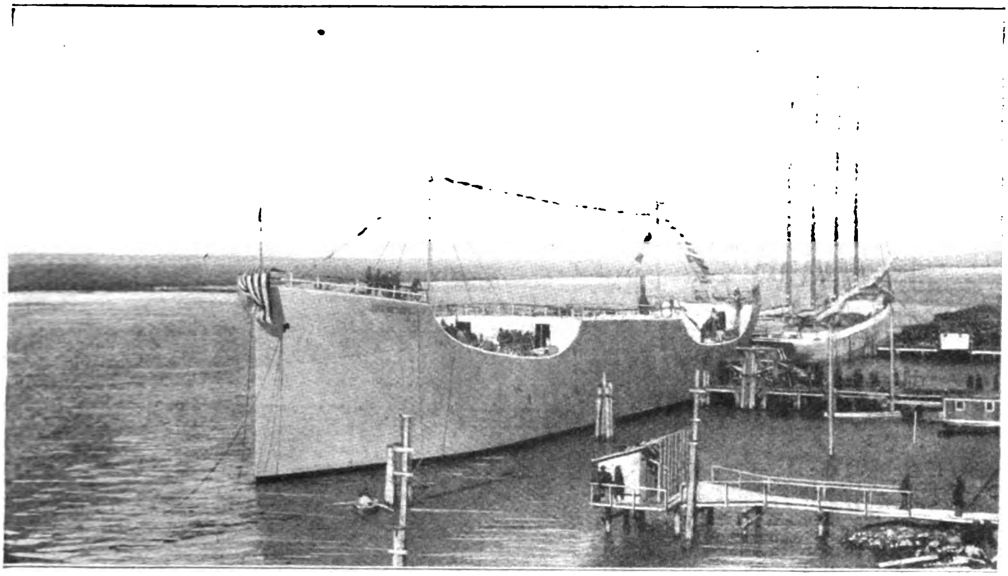


Inside Bow View of the "Atlantus" during Construction, Showing in Detail the Arrangement of the Reinforcing: Experiments of Late have Indicated That Big Advantages Probably Are to be Gained by Welding the Members Instead of Tying Them

At the outset, the thought of building a ship of concrete failed to make a particularly favorable impression on the layman, who was wont to think of concrete in terms of cement sidewalks and poorly built stucco houses. It was only natural that the average person should picture such a craft as a ponderously heavy, awkward, and snaillike scow, highly susceptible to cracking and about as seaworthy as a bucket of lead. Therefore, to many, the perfect performance of the "Faith" was a distinct surprise.

Let it be known that, from the structural standpoint at least, the problem of the concrete ship has been solved. Guesswork has not been the guide in its evolution. Concrete engineering is based on exactness, as is every other branch of engineering. Analyses that have never before been made on ships of any type, have contributed scientific data of inestimable value and placed concrete shipbuilding on a sound footing.

For instance, when the "Faith" made its maiden voyage, it carried a new instrument, developed by the Concrete Ship Section of the Emergency Fleet Corporation, for the study of hull stresses. This was the first time in history that stress



Showing How the Government's First Concrete Ship, the "Atlantus," Looks in the Water: The Vessel Is the Smallest of 14 Freighters and Tankers for Which Contracts have been Awarded. It is Expected Soon to be Commissioned

records had been taken on a ship at sea. The instrument, the McMillan "strainagraph," makes a continuous record of deformations, supplying scientific information on which to base improved designs and save materials.

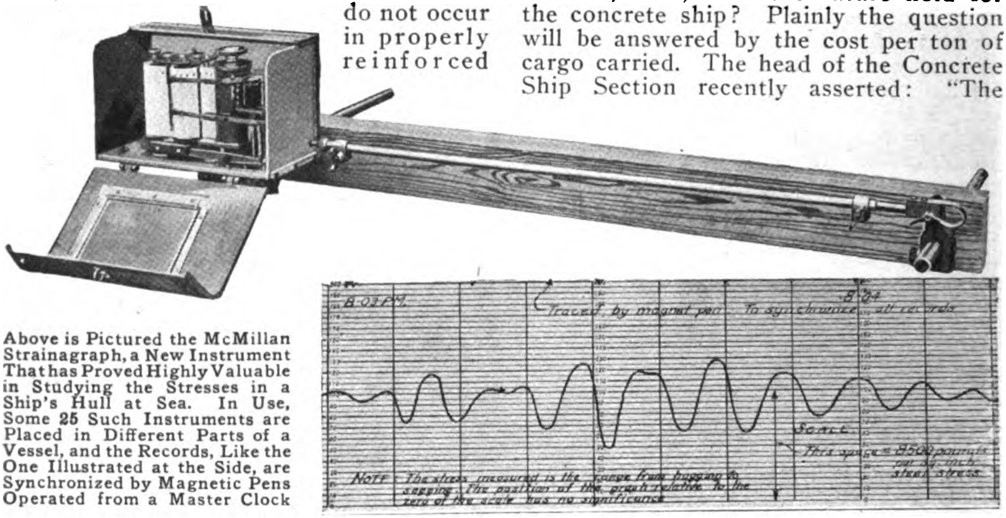
Given the known stresses on one hand, and the known strength of materials on the other, the problem of constructing a concrete ship immediately becomes one of exact calculations. In this connection, it might be mentioned that the reinforcing takes up all of the tension strains that are due to hogging, sagging, twisting, and launching. The concrete itself is depended on for its compression values. It forms the envelope, holds the steel firmly in place, and prevents the bars from buckling.

In the popular mind, concrete is rigid, brittle, easily cracked, and therefore a most unsuitable material for ships. To the contrary, reinforced concrete has considerable elasticity. An eight-inch panel, 20 ft. square, for instance, has been subjected to load and deflected eight inches.

Successful Sailing Vessels, Launches, Tugs, and River Craft have been Built of Reinforced Concrete. This Picture Shows a 40-Foot Boat of a Type Particularly Suited for River and Harbor Use

Upon removal of the load, it has come back to within three-sixteenths of an inch of its original state.

The biggest question of all, to the layman, has been that of cracks. Cracks do not occur in properly reinforced concrete. When they do occur, their appearance is due to lack of proper reinforcing to meet tensional strains. After covering thousands of miles at sea, the hull of the "Faith" was entirely free from breaks except for inconsequential hair cracks. But even in the event of a crack occurring, and water being admitted, no perilous condition would be presented unless the pumps proved inadequate. Some people forget that wooden ships, full of seams, and steel ships, with riveted plates, constantly leak and would sink in time were it not for their pumps. Also, they fail to consider that a crack in a concrete vessel could be mended at sea by filling it with concrete under heavy air pressure.


8.03 P.M.
Traced by magnet pen to synchronize all records
8.24
Scale
This space = 8500 pounds per sq. inch steel stress
Note The stress measured is the range from hogging to sagging. The position of the graph relative to the zero of the scale has no significance

Above is Pictured the McMillan Strainagraph, a New Instrument That has Proved Highly Valuable in Studying the Stresses in a Ship's Hull at Sea. In Use, Some 25 Such Instruments are Placed in Different Parts of a Vessel, and the Records, Like the One Illustrated at the Side, are Synchronized by Magnetic Pens Operated from a Master Clock

Abrasion has been another thing that has caused uneasiness in the minds of many persons. The hull of the "Faith," however, has shown no sign whatever of wear. Furthermore, a small concrete tug was used throughout the winter of 1917 to break ice and keep the water in front of a certain shipyard open. At the end of the season, examination of the hull showed no indication of abrasion.

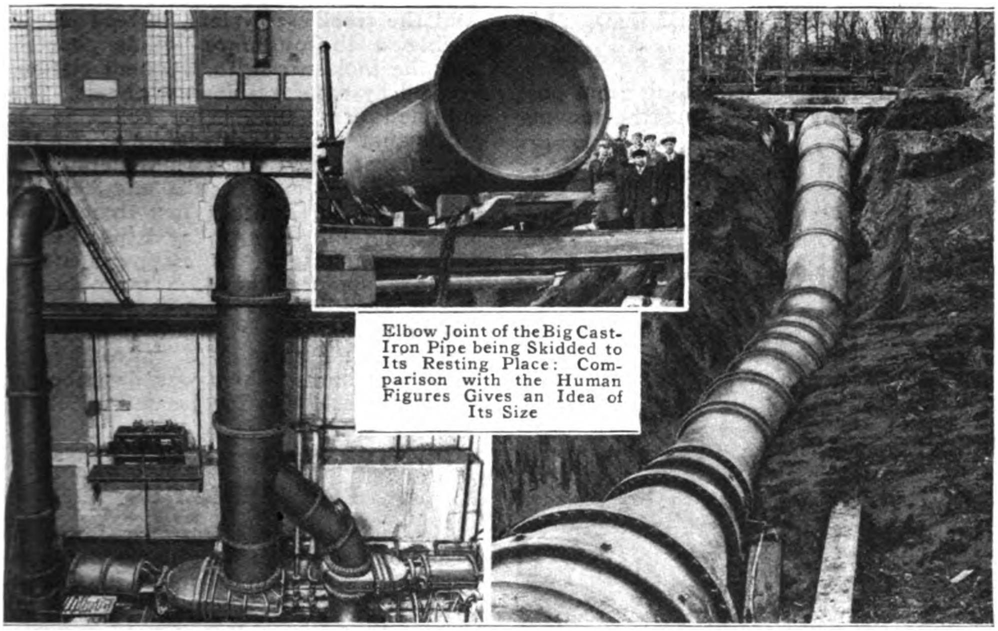
What, then, does the future hold for the concrete ship? Plainly the question will be answered by the cost per ton of cargo carried. The head of the Concrete Ship Section recently asserted: "The concrete ship is economically a success today, if the first cost of the ship is sufficiently less than the first cost of the steel ship that we may write off the decrease in earnings due to the slightly less carrying capacity—and that can be done twice over with the concrete ship as we hope to build it in these tankers [the new 7,500-ton vessels now nearing completion]."

Men who have backed the concrete ship since its birth seem sincere in their belief that eventually it will drive the steel ship from the seas. From the observer's viewpoint, it has an excellent chance of attaining commercial importance, but what it can and will do has as yet to be proved.

Right now the concrete ship faces the same situation that every new enterprise confronts at the outset—the natural hesitancy of capital to invest in a venture that seems to embody speculative elements.

SIX-FOOT CAST-IRON PIPE FOR CITY WATER SUPPLY

Water for the city supply of St. Louis, Mo., is pumped from the Mississippi River into settling basins and then through filtration plants. The Chain of Rocks pumping station has just been improved by the installation of a cast-iron pipe of huge size, which runs 250 ft. to a reservoir with a 60-ft. elevation. The new pipe is six feet in diameter and is the outlet for two pumps whose respective capacity is 110,000,000 and 45,000,000 gal. per 24 hours, making a total of 155,000,000 gal. which the pipe may be called upon to carry in a day. A Venturi meter reducing the diameter from six feet to three feet occupies 50 ft. of the pipe's length.



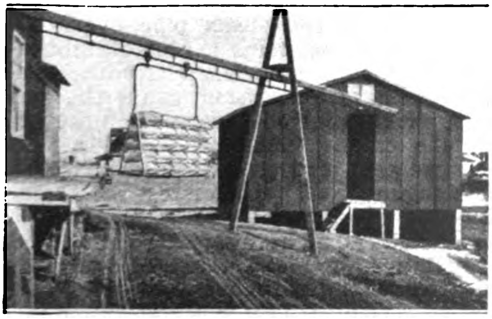
Elbow Joint of the Big Cast-Iron Pipe being Skidded to Its Resting Place: Comparison with the Human Figures Gives an Idea of Its Size

At the Left Is the Pump End of the Six-Foot Pipe, Where It Takes the Output of Two Big Pumps. The Right-Hand Picture Follows the Line of the Huge Conduit in Its Trench. In the Foreground Is the Venturi-Meter Section with Its 54,000 Pounds of Iron

The largest single section cast weighed 23,200 lb. The weight of the entire line was about 440,000 lb., the meter section accounting for approximately 54,000 lb. of this.

AIR-LINE CARRIER SAVES LABOR AT FLOUR MILL

One flour mill has found it easy to speed up efficiency by the simple installation of an overhead track and carrier, conveying the flour from the mill to the warehouse, 50 ft. away. A slight fall to the track pulls a full load of 25 sacks safely to the warehouse. Swivel trucks enable the carrier to turn two 45° bends in its journey.



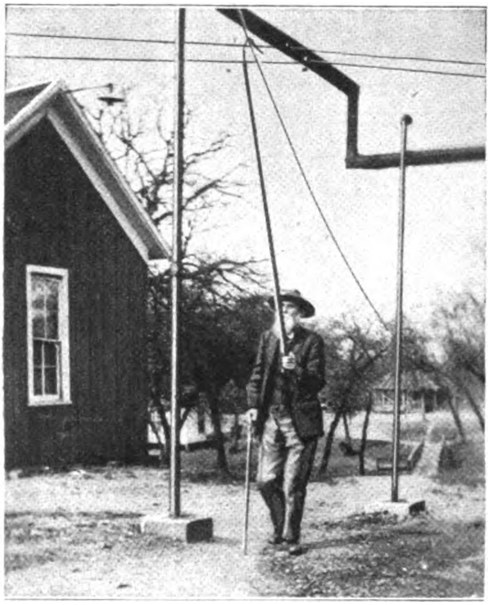
Gravity Carries Loads of Flour from Mill to Warehouse. Swivel Trucks Enable Carrier to Make Two 45-Degree Turns

STARS ON THIS "SERVICE FLAG" MEAN ENEMY SUBS SUNK

It is a service flag all right, but not at all in the usual sense. The 17 stars grouped about a tablet on the outside cabin wall of the mine layer "Quinnebaug," recently returned to the Philadelphia navy yard after nearly eight months in the North Sea, are symbols of 17 enemy submarines the ship sunk with its mines. The tablet among the stars lists the number of mines laid each month of its service, 6,045 being the total record.

Stars on the Side of the Mine Layer "Quinnebaug's" Cabin Indicate That the Ship's Mines Sunk 17 Enemy Submarines. The Tablet in the Center Lists, Month by Month, a Total of 6,045 Mines Laid

TROLLEY WIRE FOR BLIND MEN KEEPS THEM "ON THE TRACK"



Trolley System for Guiding the Blinded Veterans of the Confederate Army about the Grounds of a Soldiers' Home in Texas: In the Distance Is One of the "Stations," a Rustic Bower with Comfortable Seats

The wire is there, stretching from post to post like any trolley, and the moving rod that reaches up to make contact with it. But below, where the street car ought to be, is only an old man, holding the trolley pole upright in one hand and tapping along the path with a cane in the other. And the trackless system, instead of following a thoroughfare, winds about a parklike inclosure with frequent stations marked by comfortable rustic seats. The old men are blind. The trolley is the guide that leads them safely about the grounds of a home for Confederate soldiers in Texas. Between 20 and 30 of the old fighters have wholly lost their sight; but with their daily trolley trips and the long exchanges of reminiscences at the stop-over points, they are quite happy. The overhead trolley permits of more extended travel than the one used by an armless blind man at a railroad-men's home in Illinois, which was described in Popular Mechanics for January, 1916.

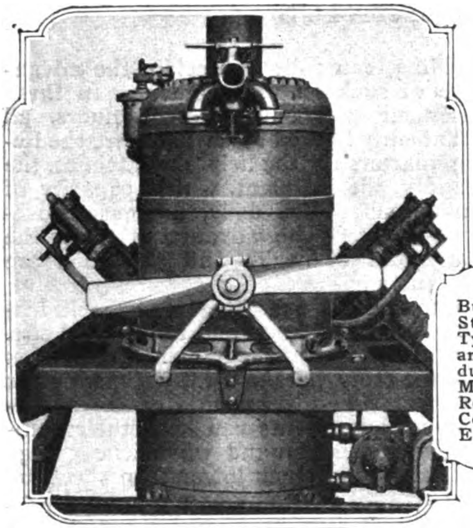
CUSTOMS OFFICERS ON WATCH FOR AIRPLANES

Airplane revenue cutters are foreshadowed by a decision of the customs officials to tax airplanes bought in Canada and flown into the United States. When a plane was recently imported in this way, under its own motive power, the question of duties arose, and it was discovered that airplanes are not mentioned in tariff acts. The above ruling was made, nevertheless, with the provision that the plane will not be taxed if it flies back again within six months, thus proving it was simply on tour.

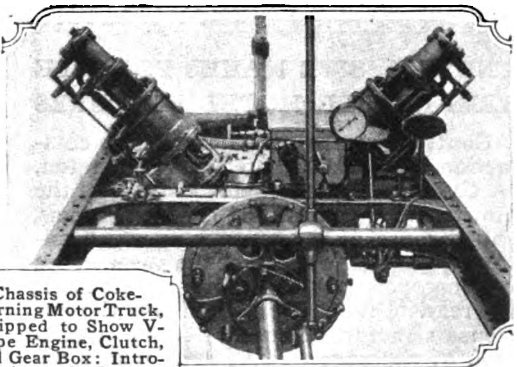
¶All persons in French war service are guaranteed the return of their old jobs, at a fair rate of pay, unless physically disqualified.

BRITISH TRUCK BURNS CHEAP FUEL

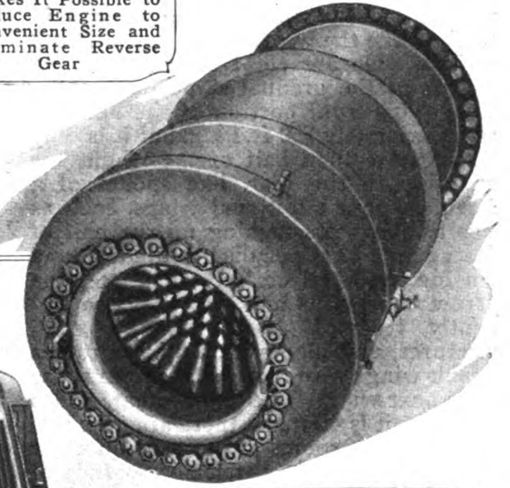
Coke is the fuel used in a new British steam-driven truck, reported to operate at a cost of about one-fourth that of a gasoline-driven vehicle of similar capacity. The coke is introduced, through the top of the hood, into a central tube which is surrounded by the boiler. This boiler is of simple design, consisting of two cylindrical steel shells flanged and bolted at each end. Withdrawing these bolts, the outer shell is easily removed, exposing the inner, which is drilled to receive 4-in. water tubes of the "thimble" variety. The engine itself is a V-type tandem compound. Two pairs of high and low-pressure cylinders operate the same crank at an angle of 90°, giving, it is claimed, freedom from vibration at speeds up to 1,500 r.p.m. The stroke is 3 in.; the high-pressure cylinders are 3 in. in diameter; the low-pressure 5 in. Oiling is handled by a dual system, a geared pump supplying general lubrication, while a drop of oil, injected into the steam pipe every 100 revolutions, maintains a film of lubrication on all inner surfaces. Another unusual feature for a steam car is the gear box, which is introduced to lessen the size of the engine, eliminate the old steam reverse gear, and make it possible to run the engine "free." Under test the engine has proved remarkably self-regulating. It ran quietly all night, adjusting water feed, lubrication, and steam pressure entirely unattended. The manual and pedal controls are similar to those of gas-driven machines, enabling comparatively unskilled drivers to run the car.



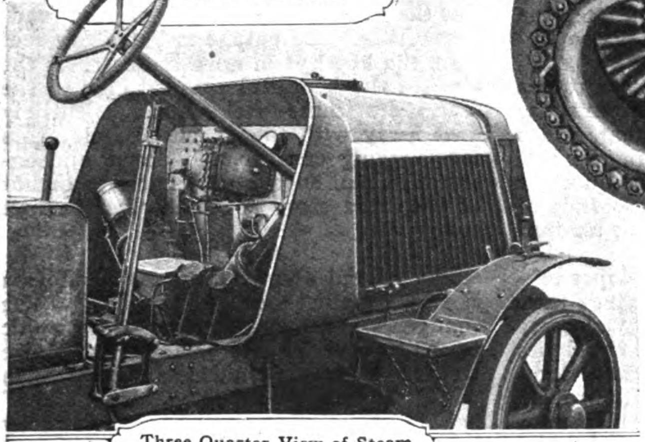
Front View of Stripped Chassis Showing Ventilating Fan and Coke-Burning Boiler: On a Three-Ton Truck the Fire is Replenished Every 12 or 15 Miles through the Central Tube in the Boiler



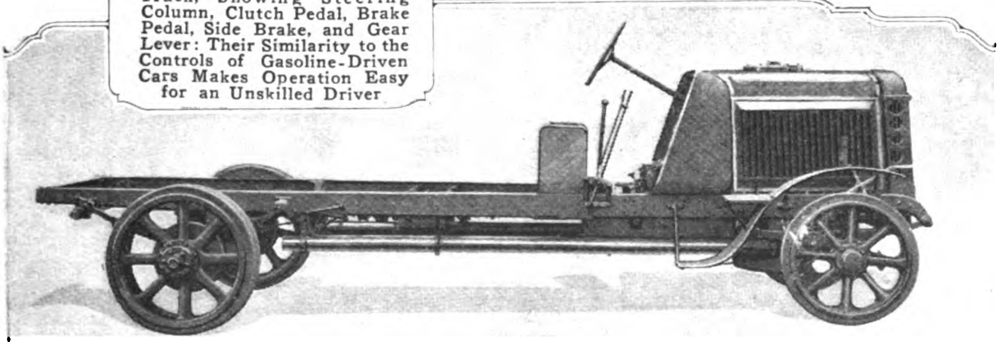
Chassis of Coke-Burning Motor Truck, Stripped to Show V-Type Engine, Clutch, and Gear Box: Introduction of Gearing Makes It Possible to Reduce Engine to Convenient Size and Eliminate Reverse Gear



End View of the Coke-Burning Boiler: Made of Two Steel Shells, Flanged and Bolted Together at Each End, the Boiler may be Readily Disassembled for Inspection and Repair. Projections from Inner Surface Are "Thimble"-Type Water Tubes



Three-Quarter View of Steam Truck, Showing Steering Column, Clutch Pedal, Brake Pedal, Side Brake, and Gear Lever: Their Similarity to the Controls of Gasoline-Driven Cars Makes Operation Easy for an Unskilled Driver



Coke-Burning, Steam-Driven Truck Seen from Side: Figured on Basis of Fuel Consumption, It is Claimed That This Three-Ton Truck can Operate at One-Fourth the Cost of a Similar Gasoline Machine

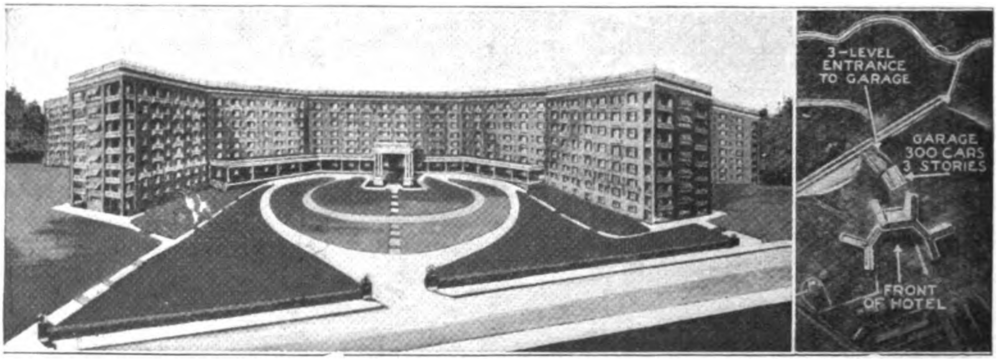
UNUSUAL SITE MAKES POSSIBLE REMARKABLE HOTEL FEATURES

Contractors are now hurrying to completion a $5,000,000 hotel in Washington, D. C., which is remarkable because of the unusual arrangement of its 1,400 rooms, and because of the manner in which advantage has been taken of the steep slopes forming part of the site, particularly at the rear. Viewed from the front the immense structure forms five sides, or one-half, of a decagon. The central portion, or three units, of the building rests on the crest of a ridge and is seven stories in height, while the wings extending forward at either side are eight stories high, on account of the gradual slope toward the front. This front portion of the building is approximately 750 ft. long, but it is only a little more than half of the whole, for extending to the rear, like spokes of a wheel, are four additional wings, each as large as the units making up the half of a decagon. This peculiar fanlike ground plan for the hotel entirely eliminates the narrow courtyards and light wells so frequently resorted to in building such structures, and places most of the rooms in each wing more than 150 ft. from those in the next wing. The approximate width of each unit is 45 ft., so there are no inside rooms, and all rooms are as near on a par for location as it is physically possible to make them, each getting the same amount of air and exposure.

Toward the rear the ground slopes precipitously, so that two of the wings have four floors below the main floor which are above ground, and one of them five floors above ground but below the main floor. Only an architect who has tried to provide adequate accommodations for help, machinery, laundry, etc., in the average hotel building, can fully appreciate the advantage of such an arrangement. In these basement and sub-basement floors, all abundantly lighted by daylight, are the living quarters for the help, the kitchens, the laundry, the ice plant, with a capacity of three tons of ice daily, immense storerooms, etc. The advantages from the standpoint of health and sanitation are obvious.

But there is one other remarkable feature about this hotel and its unusual site. Just at the rear of the immense building is a three-story garage with a capacity for 300 cars, where occupants of the housekeeping apartments can keep their automobiles. The ground which the garage occupies is so much lower than the hotel that its roof comes up only to a level with the lowest basement, and its approach along a hillside is so laid out that a portion of it enters the third-story doorway, another portion the second-story doorway, and a third portion the first-story doorway. Suitable retaining walls separate the various levels of this divided roadway. While the garage is but a few feet from the hotel, it in no way obstructs the view of the beautiful wooded hills to the rear. Its three-level entrance entirely does away with the expense of elevators for carrying cars up and down, and enables a chauffeur to get a car into or out of the third story as quickly as the first story.

¶The official abbreviation for California is now "Calif." instead of "Cal." The change was made by the Geographic Board at the request of the Post Office Department to avoid confusion with "Col." for Colorado. The form "Calif." has long been used as a standard by Popular Mechanics Magazine.

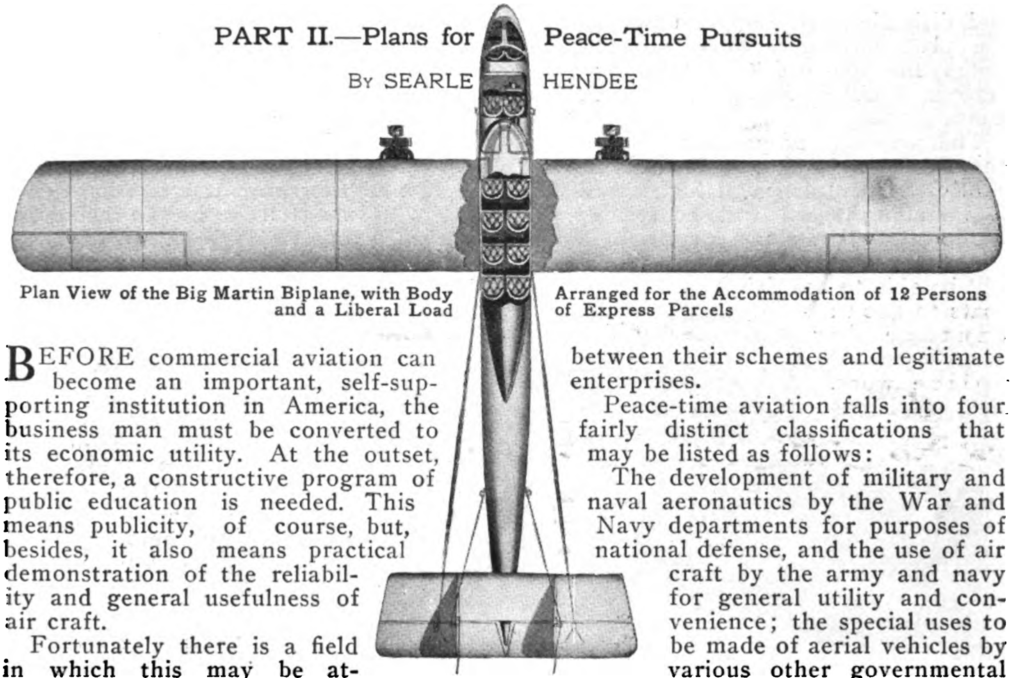


The Peculiar Fanlike Ground Plan of the 1,400-Room Hotel Entirely Eliminates Objectionable Courts and Light Wells, and Makes Every Room Literally an Outside One. The Garage, Indicated at the Right, is Situated at a Lower Level and does Not Obstruct the View from the Hotel Windows

AMERICA'S FUTURE IN THE AIR

PART II.—Plans for Peace-Time Pursuits

By SEARLE HENDEE

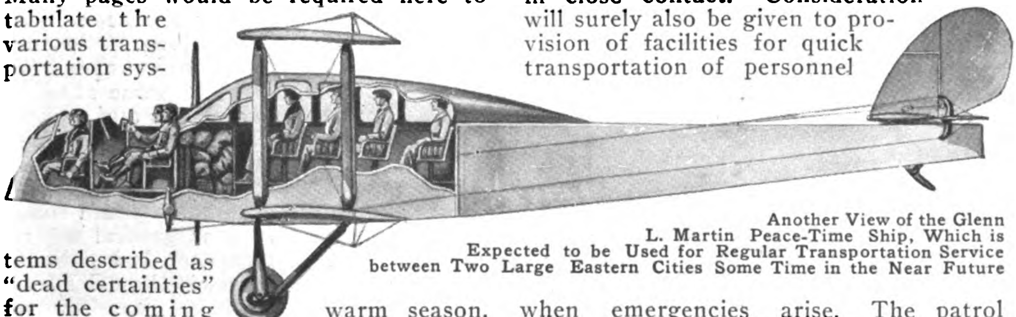


Plan View of the Big Martin Biplane, with Body Arranged for the Accommodation of 12 Persons and a Liberal Load of Express Parcels

BEFORE commercial aviation can become an important, self-supporting institution in America, the business man must be converted to its economic utility. At the outset, therefore, a constructive program of public education is needed. This means publicity, of course, but, besides, it also means practical demonstration of the reliability and general usefulness of air craft.

Fortunately there is a field in which this may be attempted. There are numerous special uses for which the aeroplane is ideally adapted. They offer a nucleus around which to develop commercial flying. As the air craft makes good in these special capacities, a wider appreciation of its possibilities will be grasped by the laity. Gradually a general demand no doubt will be created for the particular kind of service it can supply. As this grows, civil aerial transport in the broad sense of the term may be expected to become a substantial reality.

If one is willing to accept without analysis the assurances freely given at every hand, he can satisfy himself in a few minutes that, with the arrival of summer, aerial passenger and freight lines will blossom forth like spring violets. Many pages would be required here to tabulate the various transportation systems described as "dead certainties" for the coming warm season. There are many promoters, and the public must distinguish between their schemes and legitimate enterprises.



Another View of the Glenn L. Martin Peace-Time Ship, Which is Expected to be Used for Regular Transportation Service between Two Large Eastern Cities Some Time in the Near Future

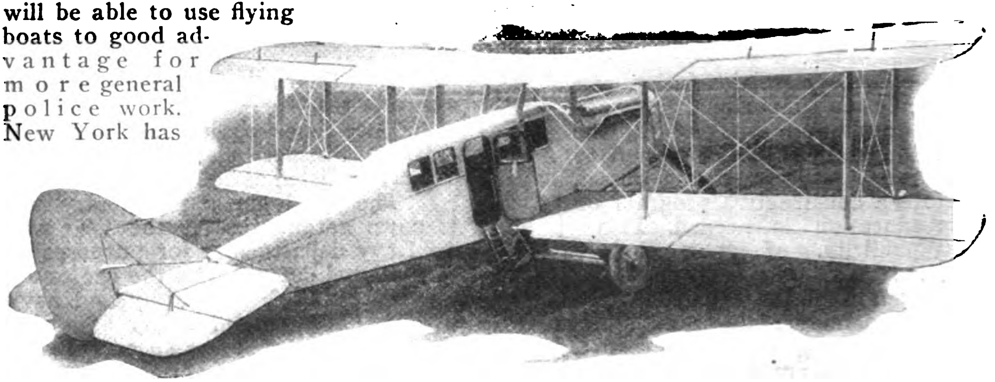
Peace-time aviation falls into four fairly distinct classifications that may be listed as follows:

The development of military and naval aeronautics by the War and Navy departments for purposes of national defense, and the use of air craft by the army and navy for general utility and convenience; the special uses to be made of aerial vehicles by various other governmental agencies, by business institutions, and private individuals owning and operating their own machines; maintenance of general passenger and express service over mapped routes between definite terminals on established time schedules, and taxi service between large centers and surrounding points; civilian flying for pleasure and sport.

In general respects no further explanation is needed of the army and navy phases of the subject. Obviously the War and Navy departments are expected to execute programs commensurate with the country's need for defense. On the other hand, in maintaining the military establishment, aeroplanes will no doubt be used for keeping the various military districts and administrative centers in close contact. Consideration will surely also be given to provision of facilities for quick transportation of personnel when emergencies arise. The patrol of our coasts and inland waterways will call for aeroplanes, flying boats, and dirigibles. In line with this will be the probable development of machines suited for the use of internal-revenue officers detailed for river and harbor work.

The necessity of policing the air will come as a natural consequence of civil flying. Sturdy planes of high speed and low landing speed will be needed for traffic regulation along air lanes. Ports and other cities that have water fronts will be able to use flying boats to good advantage for more general police work. New York has made a step in this direction, and a California city has lately added a "flying fire boat" to its equipment for fire detection and prevention.

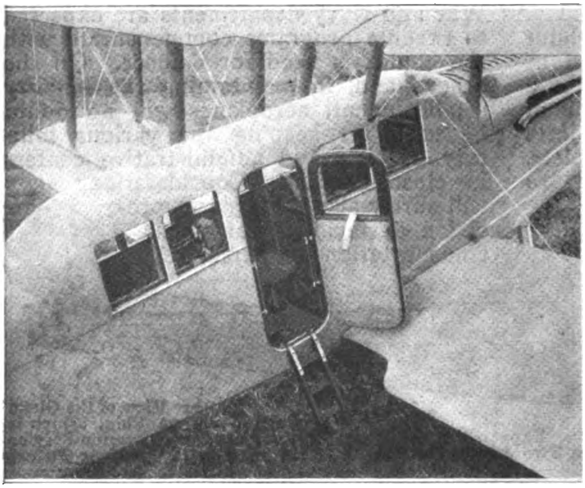
The aerial mail, already instituted by the Post Office Department, will call for many planes as the service is extended. As more routes are established and the public becomes accustomed to the air post, reasonable support is to be expected. It is true that during the few months post-office planes have been in operation, the volume of business has been light. For instance, during October last, only 939¾ lb. of "aeroplane mail" were carried. The total amount of business for the month, therefore, was not in excess of one normal full load. To make up the deficiency, 15,848½ lb. of ordinary mail were transported.



The Dayton-Wright Aerial Sedan, Built for Both Commercial and Private Use, Is an Interesting New Biplane That has Appeared Since the Conclusion of Hostilities, and Which Promises to Fill a Place in Peace-Time Air Navigation

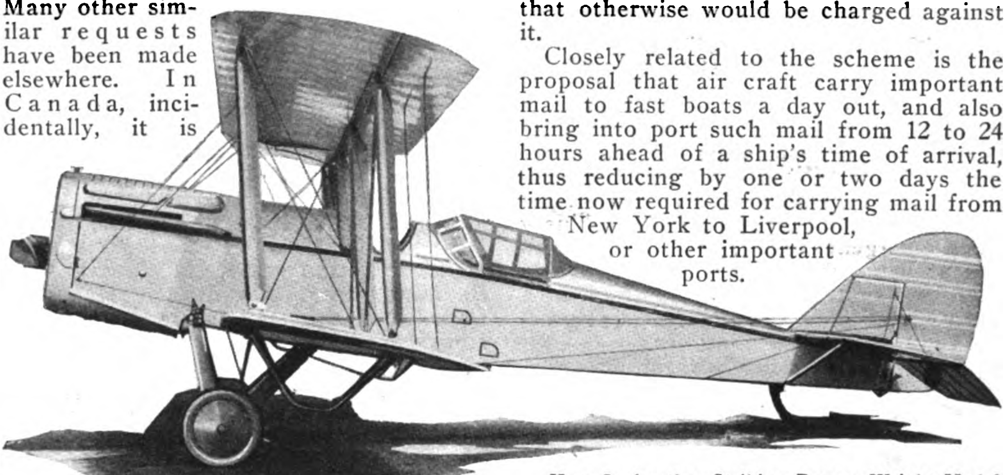
Clearly, however, it is not vital that the cost of aerial post be borne solely by the service itself, so long as there are well-founded national reasons that make highly advisable all possible development and use of aeroplanes. It is not the purpose here to make predictions, yet it may be said with reasonable safety that the time is now rapidly approaching when every city of importance, and towns now out of the direct line of communication with large industrial centers, will undoubtedly have regular and dependable aerial mail service. There are grounds also for the assumption that remote districts, and those temporarily made remote by floods and snow blockades, will be served before long.

Aerial photography opens an important field of value alike to government agencies and private interests. The Geographic Survey will be able to make good use of it, while its aid in engineering projects, mapping, and topographical work in general will be of great advantage. It is likewise conceivable that the Geodetic Survey will have uses for air craft in furthering some of its work.



This Gives a Close-Up Glimpse of the Body Arrangement of the Flying Sedan. The Cabin is Pleasingly Appointed and Affords Complete Protection from the Elements

The Forest Service contemplates employing aeroplanes in different capacities, but especially for mapping and fire-detection and fighting purposes. The utility of the air craft for such functions is too obvious to require elaboration. A requisition for 10 planes for patrol service in the Northwest was recently made by the supervisor of the Cascade National Forest, with headquarters at Eugene, Ore. Many other similar requests have been made elsewhere. In Canada, incidentally, it is expected that the Northwest Mounted Police will use air craft quite generally in their manifold activities.



Here Is Another Striking Dayton-Wright Model —the "Honeymoon Plane"—a Fast, Stanch Machine Inclosed by a Transparent Hood That Gives Protection without Obstructing the Vision

Much has been said of late regarding the employment of air craft for life-saving and exploration. Both offer interesting, although perhaps limited, fields for experimentation. Already plans are under way for an arctic expedition which may or may not be carried out in the near future.

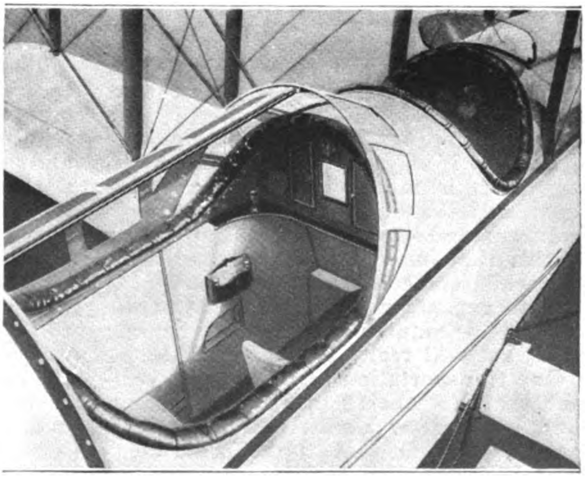
The Weather Bureau has indicated that aeroplanes may play an important part in the study and mapping of air currents, and in general meteorological work.

At least one steamship company is preparing to use fast air craft to transmit clearance papers and other documents for the handling and discharge of cargo at ports of destination, to its vessels at sea. The advantage of this is a timesaving of from 36 to 48 hours in the dispatch of freighters.

Here, the fact that, under existing conditions, a ship cannot depart without clearance papers, bills of lading, agent's instructions, and other documents, often makes it necessary to hold a steamer at its pier, or at anchor, until such papers can be prepared and placed aboard. With aeroplanes in use it will be possible for a ship to put to sea as soon as its cargo is loaded, and receive the papers when a day or so out, thus saving valuable time that otherwise would be charged against it.

Closely related to the scheme is the proposal that air craft carry important mail to fast boats a day out, and also bring into port such mail from 12 to 24 hours ahead of a ship's time of arrival, thus reducing by one or two days the time now required for carrying mail from New York to Liverpool, or other important ports.

Several manufacturers of air craft assert that mining concerns are considering the experimental use of air craft in connection with the development of prop-



Discreetly Enough, the Pilot's Position in the "Honeymoon Plane" is Placed Well Forward, and Entirely Separated from Cabin, Which is Fully Covered. The Picture Also Shows the Seating Scheme and the Appointments in the Passenger Compartment erties that, with ordinary means of communication, are inaccessible. Harry Bowers Mingle, president of the Standard Aircraft Corporation, says that Alaska, because of its great mining wealth that lies untapped on account of the lack of transportation facilities, offers a particularly good field for commercial aviation.

Some oil companies are contemplating the substitution of aeroplanes for motor cars as means of quick transportation between various properties. In oil fields, particularly when development work goes on, speed such as the air craft affords is advantageous, not only for enabling officials and those in charge of important operations to visit different points without loss of valuable time, but also for the conveyance of needed parts of machinery when emergencies arise. With the facilities at hand, money for meeting weekly payrolls could also be transported with less difficulty and hazard than is at present the case in some localities.

Large firms, having general offices at one point and factories and branch houses at other places not far distant, in certain cases may find the aeroplane useful for intercommunication eventually, but at the present time there seems to be much more likelihood of the rancher doing so. Several stockmen are already reported to have placed orders for planes.

These represent only a few of a long list of potential business uses of the aeroplane and flying boat upon which the air-craft manufacturers are counting for support. The more important of them are related to aerial transport of a general nature.

There are many transportation lines under contemplation for the near future. To state definitely that any one of them will be established and in operation June 1, or July 1, as promised by those backing them, is more than a conservative reporter is called upon to do. Manufacturers and operating syndicates face at this time many uncertain conditions, and while some of them confidently expect to execute definite programs in the coming few months, it remains to be seen just what will really be accomplished.

One transportation line that has excellent chance of being opened soon, however, is the New York-Atlantic City flying-boat system that the Curtiss company has scheduled for this summer. It is planned to use "HS-2" and "H-16" type craft and extend the service, once it is in operation, to Miami, Fla., and perhaps Cuba. Passenger rates will amount to about 50 cents a mile. The same company in addition intends to inaugurate a "land livery service" some time this spring. The routes to be flown have as yet not been made public.

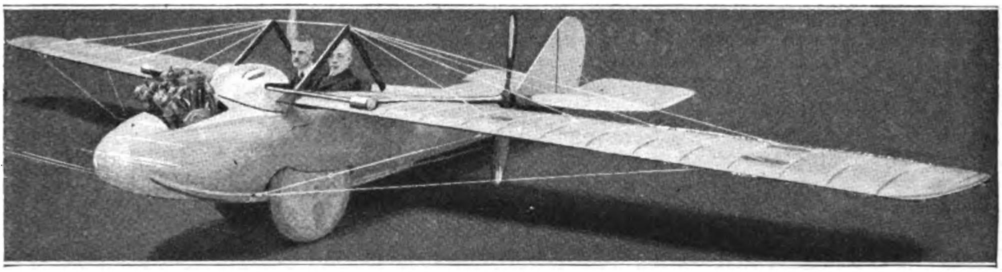
The Curtiss company is also authority for the statement that an independent operating concern is making preparations for the institution of passenger and express service between various ports on the Great Lakes, including such cities as Buffalo, Erie, Cleveland, Toledo, Detroit, Port Huron, and Chicago. Curtiss flying boats will be used on these routes when they are opened.

The United Aircraft and Engineering Corporation, with headquarters at New York, is thoroughly convinced that there is a real future in store for commercial aviation. It has under way the establishment of a trial route, of approximately 50 miles, from Toronto to Hamilton, Canada. Assurance is given that the line is to be put in operation within a few weeks.

It is this corporation that recently bought outright from the British government aeroplanes, motors, and spare parts in Canada, originally valued at $10,000,000. Most of the equipment is to be retailed and special machines of three types will be developed for the transportation service. In addition, the concern, believing a demand exists among landscape architects, map makers, engineers, and others, for aerial photographs, is organizing a commercial aerial photographic service. Planes, cameras, and accessories have already been provided for this work, which will be executed by contract.

The purpose of the Toronto-Hamilton trial route is to ascertain exact operating costs and problems. The information will be used as a basis for arranging schedules and fixing rates. As rapidly as is consistent with good business, it is planned to extend the system to other parts of the Dominion.

The famous Martin bombing plane, which travels 118 miles an hour and carries a useful load of two tons, is coming forth as an aerial passenger and freight-carrying craft. The body is being redesigned for these purposes, but the machine otherwise will remain unchanged. An operating company is to use the new craft for scheduled service between two large eastern cities, about 100 miles apart. In connection with the Martin company, it has made a comprehensive survey of the problem before it, and has worked out



The "Chummy Flyabout," a Distinctive, New Two-Passenger Monoplane Introduced during the Past Few Weeks: It is Intended as a Medium-Priced Craft for General Sporting and Pleasure Uses by Aerial Devotees

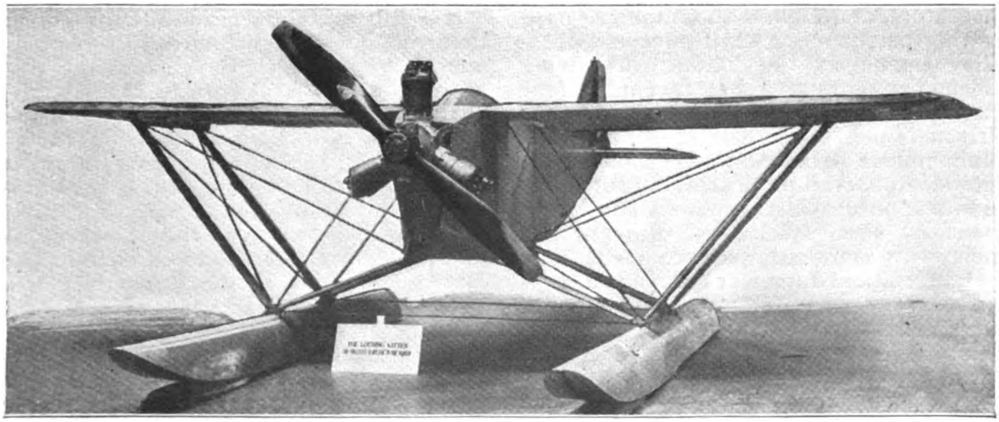
very interesting data. Although I am not permitted to give details divulging operating expenses for labor and material, or overhead distributions, it may be announced that the project involves a capital investment of $650,000. Assuming that the ships average 75 per cent of maximum load, they will do a gross yearly passenger business of $1,700,000. And if each plane carries an average of 100 lb. of mail each trip, this part of the business will amount to $368,640. These two items give an estimated net yearly profit of $600,000.

The company plans to operate six machines, each capable of carrying 12 passengers and several hundred pounds of express matter. Flight will ordinarily be made at a reduced speed of 102 miles an hour and at an elevation of 6,000 ft. The time schedules are based on a head wind of 20 miles an hour and a speed of 82 miles. When a 30-mile head wind is encountered, the motors will be operated at full throttle, while head winds greater than 30 miles will cause the schedules to fall.

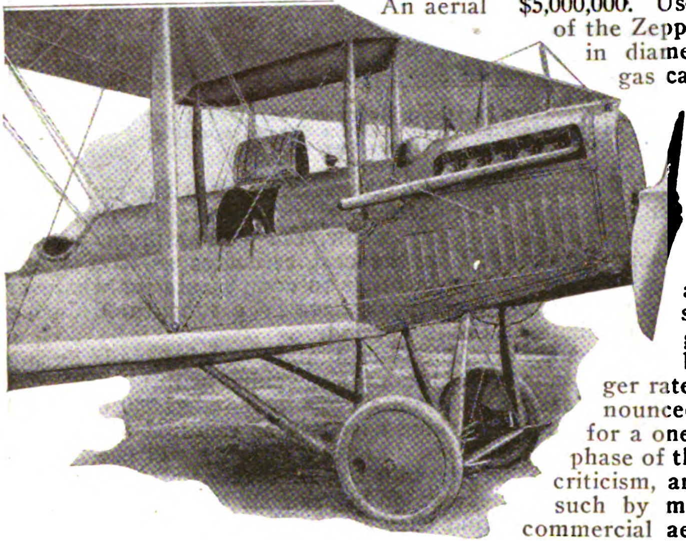
The life of each plane is placed at 1,200 flying hours. Although at the end of the period the majority of the parts will still be serviceable, the plane will be written off in the cost estimates as a complete loss in order to compensate for whatever spare parts have been substituted during the life period.

The total number of trips made during the life of a machine will be 960. To maintain a craft in the air 1,200 hours, 60 working days will be required for repairs. In six months six planes will use 24 motors, which will need new parts to the extent of 10 per cent of their value each time they are overhauled.

The schedule on which the calculations have been based provides a plane a "breathing spell" of 45 minutes between trips at each terminal, and since it is 15 minutes slower than the actual average running time, a full hour, as a rule, will be available for discharging and taking on passengers and express, filling the fuel tanks, and making minor adjustments. Ample time thus is given for getting a reserve plane from the other end of the line, if necessary, for replacement in case



Reputed to Be the Smallest Practical Seaplane in Existence, This Tiny Loening Craft is Well Designed and Stanchly Built. It was Exhibited in New York Recently and Attracted Much Attention Both from Aeronautical Engineers and the Public Generally



Showing the Mail Compartment of One of the New Curtiss Postal Planes Developed for the Use of the Post Office Department: Rapid Extension of the Aerial Mail Service is Expected in Aeronautic Circles

of injury in landing. Furthermore, since the next ship on the schedule would actually be due at the "damaged ship's" time of departure, it could be used for replacement and its own return trip made by the other machine after the completion of repairs. An aerial passenger and freight system requires a much larger personnel than one would think. The particular system in question plans to have a force proportioned as follows:

Executive personnel: general manager, treasurer and accountant; passenger agent and publicity manager; assistant general manager; chief engineer; four inspectors, and eight stenographers. Operating personnel: a chief pilot and operating manager; 14 pilots; 10 flying mechanics; four ticket agents; four starters; 40 field mechanics; four bus drivers, and four wireless operators. Maintenance personnel: two shop superintendents; one purchasing agent; one assistant purchasing agent; six shop foremen; 60 shop mechanics; four draftsmen; two shop maintenance men; four watchmen, and four stenographers.

Passenger and freight rates have not been definitely announced, but it is understood that passengers will be carried for about 20 cents a mile.

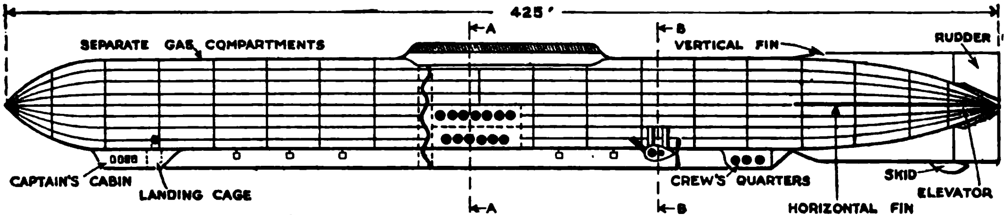
Turning attention for a moment to the dirigible, which for long-distance and heavy-load operation has certain points of advantage now that helium gas is taking the place of hydrogen, plans are under way for the inauguration of 12-hour airship service between New York and Chicago. The enterprise is fathered by interests identified with the Sturtevant Aeroplane Company of Boston, and contemplates a capital investment of $5,000,000. Use is to be made of dirigibles of the Zeppelin type, 425 ft. long, 45 ft. in diameter, and of 650,000-cu.-ft. gas capacity. According to some reports the ships are now under construction. At least, however, they have been designed. Equipped with motors aggregating 1,200 hp., they will easily carry useful loads of 10 tons and maintain 70-mile-an-hour schedules, it is asserted. Twenty-five passengers and a crew of 10 will be accommodated. Passenger rates have been tentatively announced as 65 cents a mile, or $520 for a one-way trip. Admittedly this phase of the project is open to serious criticism, and has been the subject of such by many of those interested in commercial aeronautics.

Because of the long flying radius of dirigibles, and the fact that motor trouble does not affect them so vitally as it does aeroplanes, their potential value for commercial use is considered great. One company is now being formed, ostensibly for the purpose of inaugurating dirigible passenger and freight service between New York and South American ports. The use of Italian-built ships has been decided upon, and a passenger rate of approximately 10 cents a mile proposed.

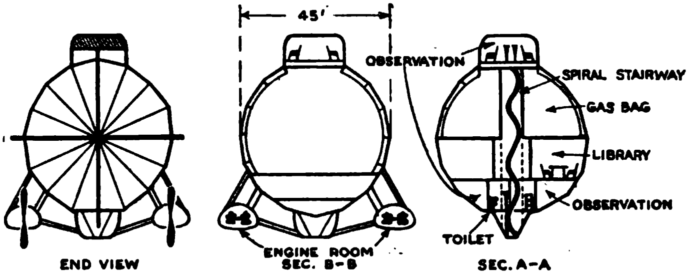
It will be observed, from the foregoing, that the question of rates and costs is one about which there is great variance of opinion. Charges of from 20 to 50 cents a mile are planned by aeroplane companies, and from 10 to 65 cents by airship companies. Obviously there is a good deal to be learned about the commercial operation of air craft.

The whole future of the enterprise is bound up in the problem of costs. The December report of the Post Office Department, covering the cost of operating and maintaining postal planes, throws interesting light on the subject. The record of two of the planes, showing the distribution of overhead as well as other items, follows:

Gasoline, $129.98; grease and oil, $22.24; office force, $40.21; motorcycles



The General Appearance of the Zeppelin-Type Dirigibles Planned for New York to Chicago Service: In the Center Portion of the Ship, above the Main Cabin, Are Observation and Library Rooms, and a Spiral Staircase That Connects with the "Roof Garden" on Top



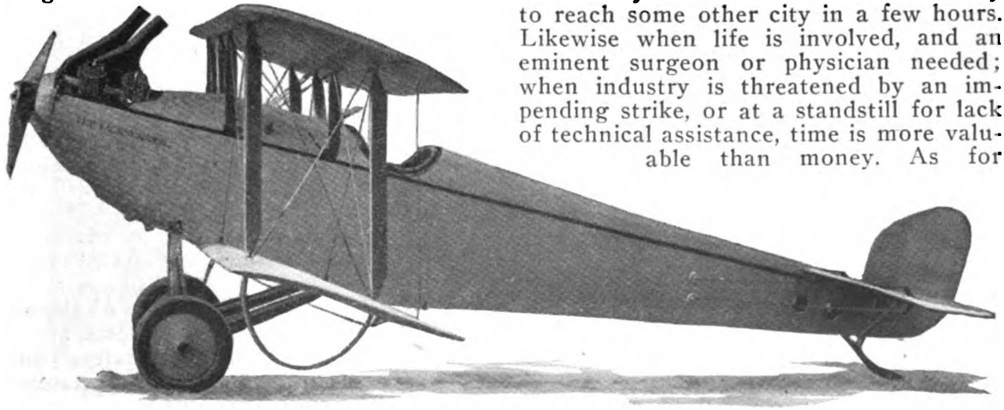
The Cross Sections Above Are Self-Explanatory. The Ship Has a "Roof Garden" and is Designed to Carry 25 Passengers and a Crew of Ten

and trucks, $63.04; rent, light, fuel, etc., $33.50; miscellaneous, $119.76; pilots, $202.65; mechanics and helpers, $134.40; repairs and accessories, $249.76; interest on investment, $70.11; departmental overhead charge, $85.31; total, $1,150.96; total time run, 23 hours and 38 minutes; total miles run, 1,706; miles run per gallon of gasoline, 4.13; cost per hour, $48.69; cost per mile, $.6746.

On the other hand, averaging the expense of operating 16 postal planes throughout the month, a cost of $95.05 an hour, or $1.3551 per mile, is shown for each machine.

Where is the high-price business for such high-priced service to come from? If there is anyone who absolutely knows, he is keeping the information to himself. The whole project is a speculative one. It remains to be proved that commercial aviation can be supported profitably. Here, however, are some of the possible sources of business upon which prospective operating companies are pinning faith:

Passenger traffic in general divides itself into two classes, namely, that which is for business, and that which is for pleasure. Speed is of vital importance to many business men. Some, for instance, have necessary trips to make at times they can ill afford to be absent from their offices. To make such trips and accomplish their work in a day or two, instead of spending a week at it, often would be worth thousands of dollars. It is conceivable, too, that the high-salaried representative traveling to South America, China, or some other distant locality, might well afford to proceed by air craft, considering that salary, expenses, and loss of time would be more expensive than fast travel at high cost per mile. In every large city there are men of wealth who, on occasions, would spend almost any reasonable amount of money to reach some other city in a few hours. Likewise when life is involved, and an eminent surgeon or physician needed; when industry is threatened by an impending strike, or at a standstill for lack of technical assistance, time is more valuable than money. As for



"The Messenger," a Side View of Which is Presented Here, Is an Attractively Designed Little Biplane That is Coming Forth as a Dayton-Wright Sporting and General-Utility Craft for Civilian Use

the other half of our travelers, those who are pleasure-bound, it is conceivable that many, for the sake of novelty or variety, would make use of air routes.

Transportation by aeroplane in regions now made remote by lack of railway facilities or because of poor steamship service, offers real advantages. In South America, in northern Canada, in Alaska, and other places on the continent, an aeroplane can travel between points in a few hours that by other mediums of transportation are days and even weeks apart.

Many of these same general conditions have a bearing on the aerial express business. Perishable products in some instances might be handled advantageously by air craft. Under this classification would come rare and costly fruits and flowers, and products of quite different character with value that depends on quick distribution. Of the latter group, newspapers and news films are cited as examples. Moving pictures of great news interest, for instance, filmed in New York in the afternoon and exhibited in Boston, Philadelphia, and Washington theaters in the evening, would have much greater value than if shown the following day. The same is true of newspaper photographs. If Chicago newspapers, for instance, received pictures the same day they were taken in New York, St. Louis, or Kansas City, their value would be several times greater than it now is.

THE QUEST OF THE CLOUDLAND FLEECE

By SOPHIE E. REDFORD

Like gray moths waiting to spread their wings
Unfinished air craft stand.
Mute prophecies they, of wondrous things
By bold adventure planned.
Across their bodies the workmen creep,
Tuning their shafts aright,
For a birdman's ready his tryst to keep
With a record-breaking flight.
Oh, which shall be first 'mongst these to rise,
From its chrysalis state set free,
To win for man his coveted prize
In the race to span the sea?
Oh, craftsmen, temper the brace of steel,
Oh, cable the aileron true;
The hand that will pilot the sky-boat wheel
Is trusting his nerve, and—you!
Oh, bolts and sockets and cotter pins,
Propellers and struts and stays,
Whatever the name of the man who wins,
With you he must share the praise,
When out of the factory, mine, and mill,
The forest and field and stream,
The man and the man-made bird fulfill
The "Transatlantic Dream"!

Not long ago progressive assemblage in a large Detroit motor-car plant was interrupted because of delay in arrival of a shipment of valves manufactured in Cleveland. Aeroplane delivery would have saved a loss of several thousand dollars in time. Similarly it often occurs that a large plant is brought to a standstill by disablement of some vital machine. In the oil fields and the mining regions a breakdown of the power equipment may cause serious difficulties. For lack of a single spare part great financial loss may be incurred. Here again aeroplane delivery comes to the fore.

Aerial post enables a business firm to forward a 5,000-word letter for no greater cost than a 50-word night message by telegraph, and obtain, within a radius of about 800 miles, equally fast service. It also permits the quick delivery of important papers, thus allowing contracts to be signed and other transactions completed, between firms and individuals in different cities, at a great saving of time.

Very few of the most optimistic backers of civil aerial transport expect a sufficient volume of business at the outset to support the enterprise. They see a long, hard pioneering task ahead. But be this as it may, they are confident that in the long run the idea will pay out.

Grover Cleveland Loening thinks that taxi service will pay long before regular scheduled service can be made profitable. He assumes that in New York, or Chicago, for instance, enough emergency business arises daily to support an aerial transportation company that would have a centrally located aerodrome with machines ready for fast flights at a moment's notice to any point of the compass.

Glenn L. Martin, admitting that commercial aviation will have a hard fight for business in the near future, contends that railway-operating ideas must be adopted. "Commercial lines over long routes," he says, "as between New York and Chicago, must have division points where passengers and express may be transferred to 'fresh' machines. An 800-mile line, or an 8,000-mile one, is absolutely feasible from an operating standpoint if it is made in relatively small jumps."

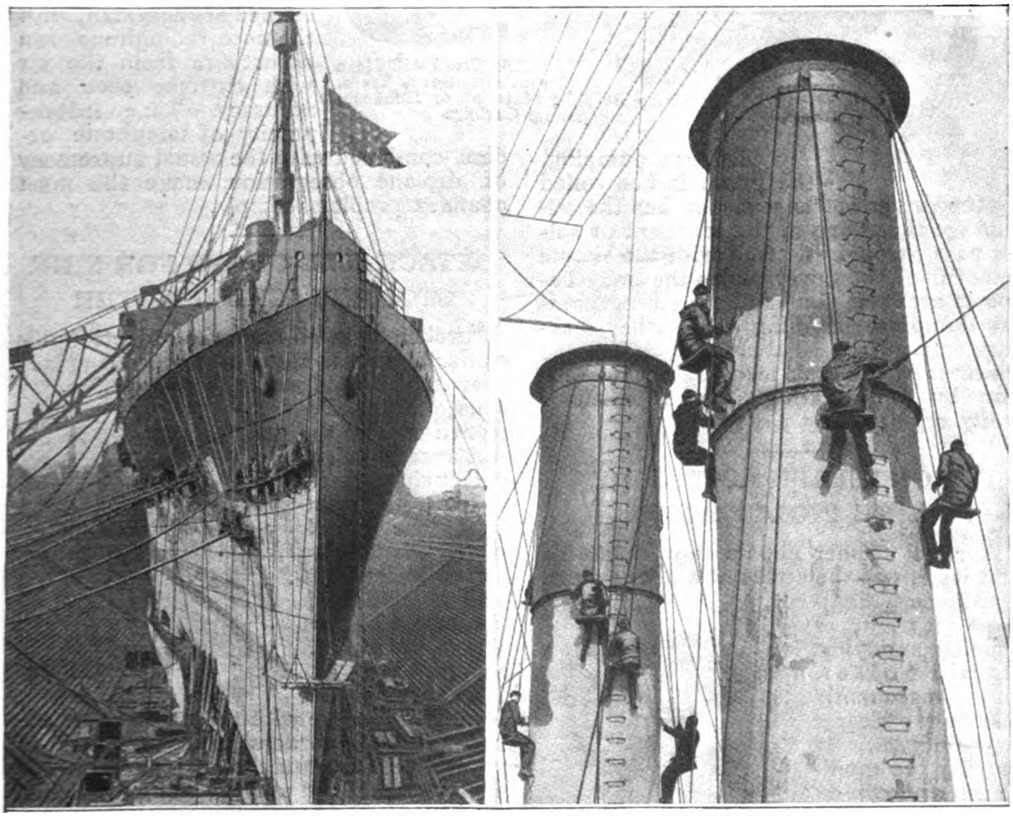
One of the most interesting of the recent developments to give material aid to civil aerial transport is the wireless compass. This is rapidly nearing a state of completion, and is an instrument that will reduce hazards to the minimum. As previously mentioned, fog and darkness, but especially fog, often make landing extremely dangerous. The wireless compass is designed to indicate the position of an aerodrome and enable a pilot to "feel" his way down until the field becomes visible and a safe landing can be negotiated. The instrument has been perfected to within 3° of accuracy. Further refinement is expected to overcome all error. When this is accomplished, and radio-equipped fields are established at frequent intervals, a fog-bound ship, even facing the necessity of a forced landing, will be able to reach the ground in safety.

To many, the sporting phases of aviation hold chief interest. Since flying became a mechanical possibility, thousands of persons have visualized the time when aeroplanes would be as common as family vehicles.

What can be said, then, of this side of the subject?

Cost is the answer. At present the aeroplane is in the private-yacht class. There are thousands of persons financially able to own and operate planes. There are scores who will do so. But widespread flying—that is, flying on a scale such as motoring enjoys today—remains for the years to come.

Good machines are available at prices ranging from $5,000 or a little more, to $45,000 and as much more as one is willing to pay. After this comes the upkeep, which, unfortunately, is expensive. Efforts, however, are being made to develop small, safe, moderate-priced planes that will be in the motor-car class as concerns operating costs. That success in this commendable endeavor will broaden the sporting use of aeroplanes immensely is too obvious to require comment.



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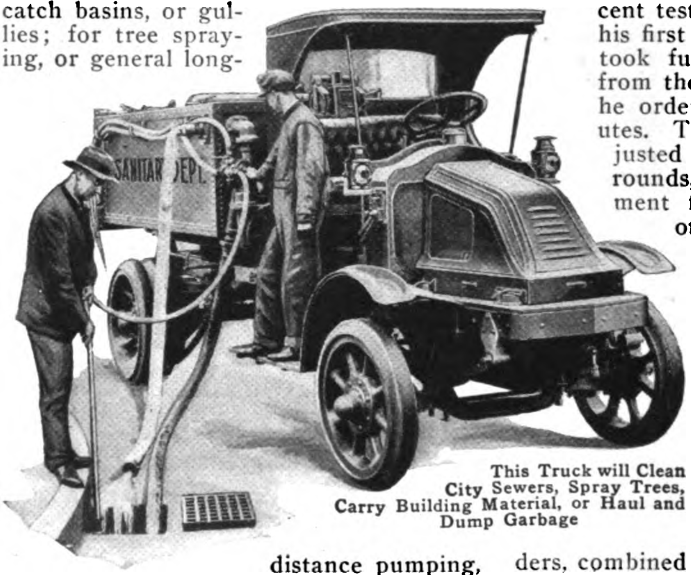
BIG TRANSPORT WHICH RAN AGROUND IS UNDERGOING REPAIRS IN DRY DOCK

WITH all the lines of its gigantic hull showing in imposing aspect, the transport "Northern Pacific" lies in dry dock. The big ship ran aground off Fire Island a short time ago, and is undergoing repairs. On account of the overhang, scaffolding for painting the sides had to be braced from the dock. Bluejackets from the navy yard hang suspended on little individual scaffolds while they paint the giant smokestacks.

MUNICIPAL AUTO TRUCK SERVES MANY PURPOSES

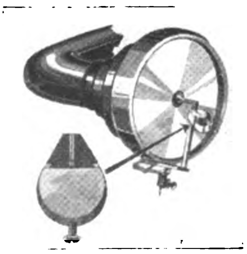
A new auto-mounted pumping apparatus should be a versatile and efficient addition to any municipal equipment. Used for cleaning sewers, catch basins, or gullies; for tree spraying, or general long-distance pumping, the pump is controlled by the driver at his seat, and has the advantage that none of the sediment or solids pass through it. And with the simple removal of the cover plates the body becomes available for hauling and mechanical dumping, handling coal, ashes, garbage, etc. Used as a sprayer, again, the contents of the tank may be kept in solution by an agitating feature which is easily regulated by a valve.



This Truck will Clean City Sewers, Spray Trees, Carry Building Material, or Haul and Dump Garbage

PHONOGRAPH ACCESSORY LIKE VIOLIN MUTE

A small rubber clip is now marketed that fastens to the stylus of a phonograph reproducer, eliminating, it is claimed, annoying, scratchy noises, and consequently insuring clearer reproduction. By moving the modifier up or down on the stylus, added control of sound volume is secured. A slight pressure on the bottom opens the rubber jaws of the attachment.



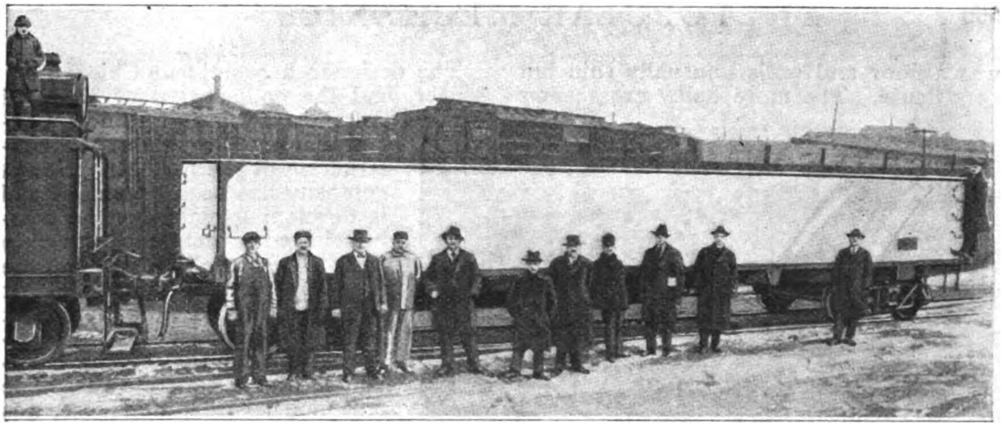
AERIAL RADIOPHONE A MARVEL FOR ARTILLERY ADJUSTMENT

A flier who knew nothing about artillery adjustment until just before his flight gave successful gunfire commands through the aero radiotelephone in a recent test at a western field. After his first lesson in adjusting fire he took full control of the battery from the air. In his first problem he ordered 22 rounds in 19 minutes. Then, in 14 minutes, he adjusted the range, ordered 16 rounds, including six in improvement fire, and brought up another gun. The next day he corrected the fire of the whole platoon, finding no trouble in catching and rectifying errors intentionally set against him. This result is taken to demonstrate that a trained artilleryman, with the aero radiophone, can adjust fire from the air with extreme ease and accuracy. The instantaneity of telephone orders, combined with the visual supremacy of airplane observation, make the most complex problems simple.

DETACHABLE GUARD FOR SINK STOPS SPLASHING WATER

Kitchen sinks all have the objectionable characteristic of allowing water to splash over the front edge, with moist and messy consequences. Designed to stop the nuisance is a light detachable guard, which, slipped over the sink edge, stands up like a water-tight wall to hold back the misplaced spray. It is high enough for full protection, but does not interfere with the free use of the sink. Round corners and absence of seams keep the attachment sanitary. It is quite light, and may be hung up when not in use.

ℂAmerican lads are now replacing aliens almost entirely in the firerooms of American merchant ships.

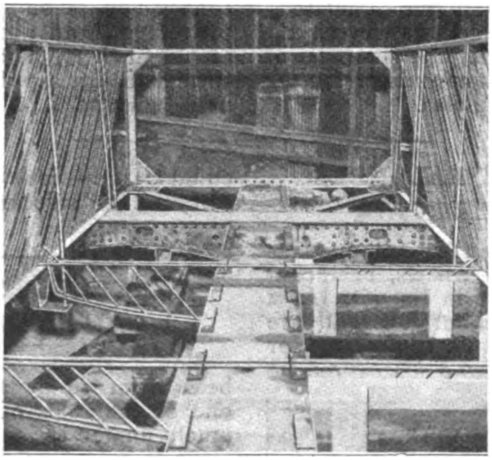


Gondola Freight Car with Concrete Body: The Steel Frame at the Corners and Upper Edges Is Plainly Apparent in This View, Which Also Gives Some Idea of the Smooth, Uniform Outer Surface Obtained by the Method of Shooting the Mixture against the Forms with a Cement Gun

CONCRETE FREIGHT CAR IN SERVICE

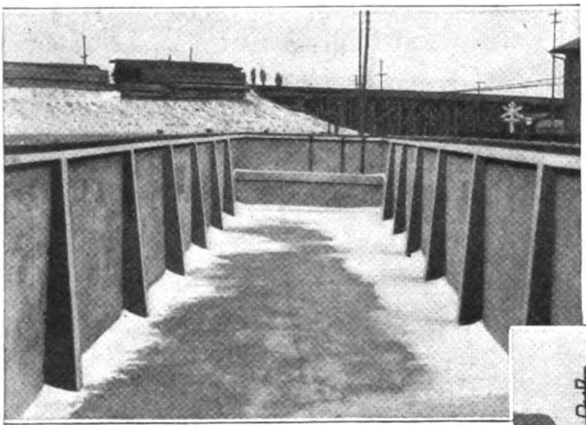
A GONDOLA freight car with a body made entirely of reinforced concrete is now in actual railway service. The finished car, first of its kind, was ceremoniously delivered by its designers to the Illinois Central Railroad, on March 17. It was immediately started on a trial trip over the lines of the system, and for 30 days will encounter all the normal uses and abuses of the hard-working gondola-type car. At the end of that period it will be turned over to the United States Railroad Administration, which will thereafter dictate its use and service. The thoroughly tested, and accepted, car represents the fruition of the plans announced in Popular Mechanics last August, and so adds one more to the list of great permanent industrial advances spurred to accomplishment by the emergencies of war.

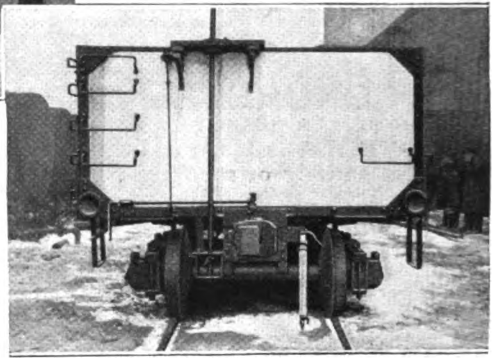
The concrete body of the car is framed in a steel skeleton, whose lines follow the vertical outside corners and horizontal edges. A steel underframe, of similar design, forms the foundation. Frame and underframe, as well as braces and reinforcing bars, are so connected and interlocked as to distribute drawbar and other stresses over the whole structure. Railroad Administration standards for a coal car of 100,000-lb. capacity with a 10-per-cent overload factor, were followed in the design. Taking 200,000 lb. as the drawbar pull, the unit stress in the steel figured at 16,000 lb., and in the concrete, 1,000 lb. The finished car is 41 ft. 6½ in. long, over all, and 10 ft. 2⅞ in. wide, and the sides of the body are 4 ft. 10½ in high. While the model now in service has a solid body for the sake of simplicity, the principles of the design indicate ready modification into the dump-car type for subsequent production. Box and flat cars, as well as the specialized forms peculiar to certain services, will follow without difficulty the precedent of the gondola model, selected for the test because all the hardships of the road fall to the lot of that particular type.



Method of Reinforcing the Concrete Body with Steel Bars Braced Obliquely in the Frame: On the Cross Bearers in the Floor the Concrete was Molded in Forms in the Customary Manner

A special, light aggregate, developed by an engineer of Kansas City, Mo., found its first commercial application in the concrete mixture used for this car. Its normal weight of 104 lb. per cubic foot was slightly increased by the method of forming adopted. The mixture was shot against outside forms by a cement gun inside the frame. The result of this process was a floor and walls unusually thin but very dense. The more bulky crossbeams of the underframe were formed by pouring in the ordinary manner. The inside surfaces were left as the cement gun finished them, but the outside walls are quite smooth because of the close cohesion with the forms. Completed, the car weighed about 3,600 lb. more than was calculated; subsequent similar models, however, can readily be kept within the bounds of 46,000 to 48,000 lb., approximating the standards of steel gondolas.



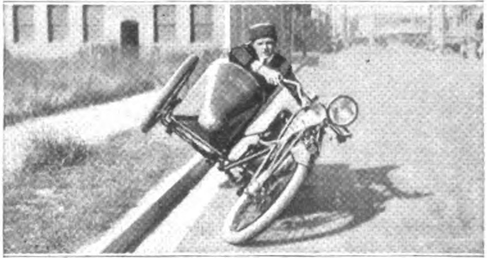


On the Inside of the Car, as Seen Above, the Concrete Remains Much as the Cement Gun Left It, Which Is Sufficiently Smooth for the Uses to Which a Gondola Car is Put. The Ribs along the Sides Cover the Bars Connecting the Bottom Cross Bearers with the Top Frame, as Seen in the Reinforcement Picture. At the Right Is an End View of the Car, with All the Usual Freight-Car Fixtures in Place

The designer, a prominent Chicago engineer, had the coöperation of Railroad Administration and Illinois Central officials throughout the construction of the first car. Now a company has been organized and is developing plans for the commercial construction of concrete freight cars of all types along the lines pioneered by this model. It is interesting to note here that European engineers also are paying some attention to the possibilities of the concrete car. The first model, cast in one piece, was successful, but had a capacity of only six tons. The second trial resulted in improvement, and a plant is being erected at Doetinchem, Holland, whose manufacturing facilities will be devoted to this new industry.

MOTORCYCLIST BALANCES SELF AND CAR IN AIR

One motorcyclist goes them all one better by driving on two wheels, balancing himself and his sidecar in the air. At a speed of 25 miles per hour few will care to attempt this trick. It is nothing for this expert, however, who discovered he could ride this way while performing motorcycle and sidecar tricks for a motion-picture firm.

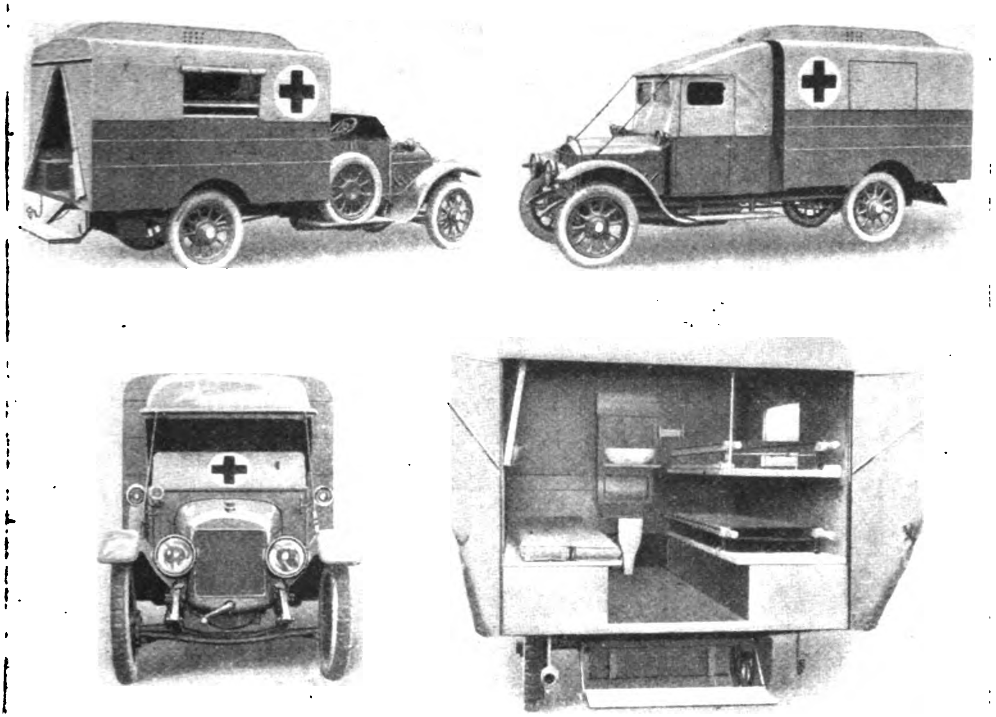


COPYRIGHT, JOHN EDWIN HOGG

This Motorcyclist Rides about Town in His Sidecar While Tilted Up on Two Wheels

AIR COMPRESSOR FEEDS AIRPLANE ENGINE

Slower speeds at higher altitudes has been regarded by airmen, heretofore, as one of the rules of the game. But not much longer, if a Frenchman's attachment is as successful generally as in experiment. As described, his idea is a simple one, involving only a turbine air-compressor which is driven by the engine exhaust and feeds the intake with air of normal density. With the engine thus developing full power at all altitudes, it seems that more, rather than less, speed will be possible as the plane climbs higher and encounters rapidly decreasing air resistance.

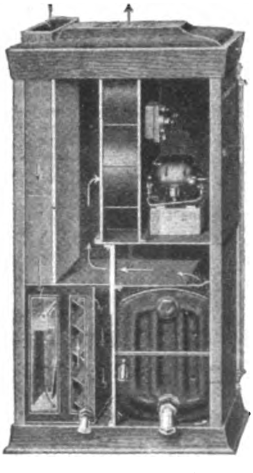


At the Top, and Below at the Left, Are Open, Closed, and Front Views of a Much Used British Type of War Ambulance. The Rear View, Lower Right, Shows Stretcher Space, Box Seats, Attendant's Seat, and Locker at Front. This Model Has Flat, Easy Springs Like a Railway Coach

AMBULANCE REFINEMENTS GIVE GREATER EASE AND COMFORT

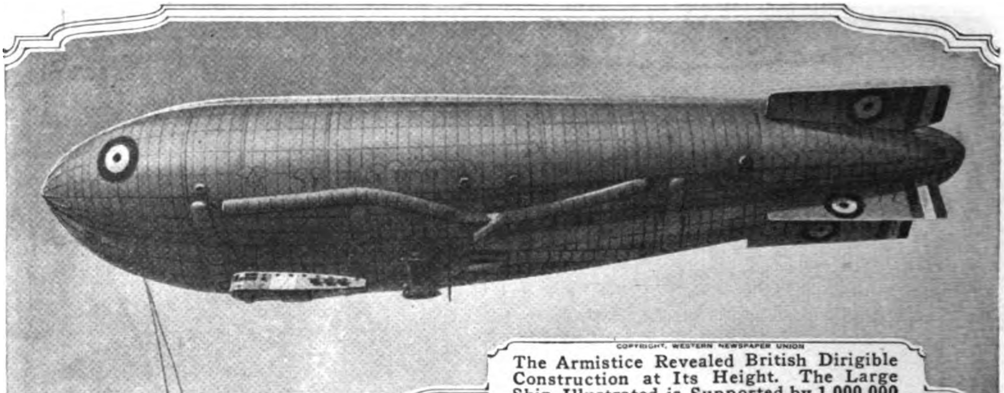
Long-distance hauling of war casualty cases, made necessary by the Hun's taste for hospital bombardment, brought about the development of a number of improvements in ambulance design. A British type of body, mounted on a chassis slightly longer than standard, was fitted with a flatter style of spring than usual, similar to those used in railway practice. A pneumatic system of suspension was adopted on some models, consisting of a rectangular cylinder, 12 by 14 in., like a box with a sliding cover, containing a strongly reinforced pneumatic cushion of rubber and canvas. This took the place of elliptical springs and shock absorbers, giving a vertical play of four inches and proving quite satisfactory in tests. Two tiers of stretcher rails in the body accommodated four army stretchers at once, with space under the seats for unused stretchers or seat cushions. The attendant's seat and locker are at the front, where he can speak to the driver. Ventilators are provided in the roof.

SMALL AIR WASHER FOR USE IN HOME OR OFFICE



An air washer and ventilator has been designed that is approximately the size and shape of a cabinet phonograph. Being compact and portable, it may be used in any office or factory which is supplied with water, heating, and electric-light connections. Enameled in any desired finish, the machine will be inconspicuous among the furniture of a private home. The air is drawn from outdoors, through a spray bath, past a radiator, and is expelled by a variable-speed, motor-driven fan, at a maximum rate of 20,000 cu. ft. per hour.

WAR DIRIGIBLES OF THE BRITISH NAVY NOW



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The Armistice Revealed British Dirigible Construction at Its Height. The Large Ship Illustrated is Supported by 1,000,000 Cubic Feet of Gas, but It is Announced That a Dirigible Now Building will Have a Capacity Ten Times as Great

COPYRIGHT, INTERNATIONAL FILM SERVICE, INC

Before Inflating the Giant New British Dirigibles a Final Inspection is Made of the Interior of the Bags. The Women Workers Shown are Making Sure that All Seams are Properly Cemented to Prevent Leakage

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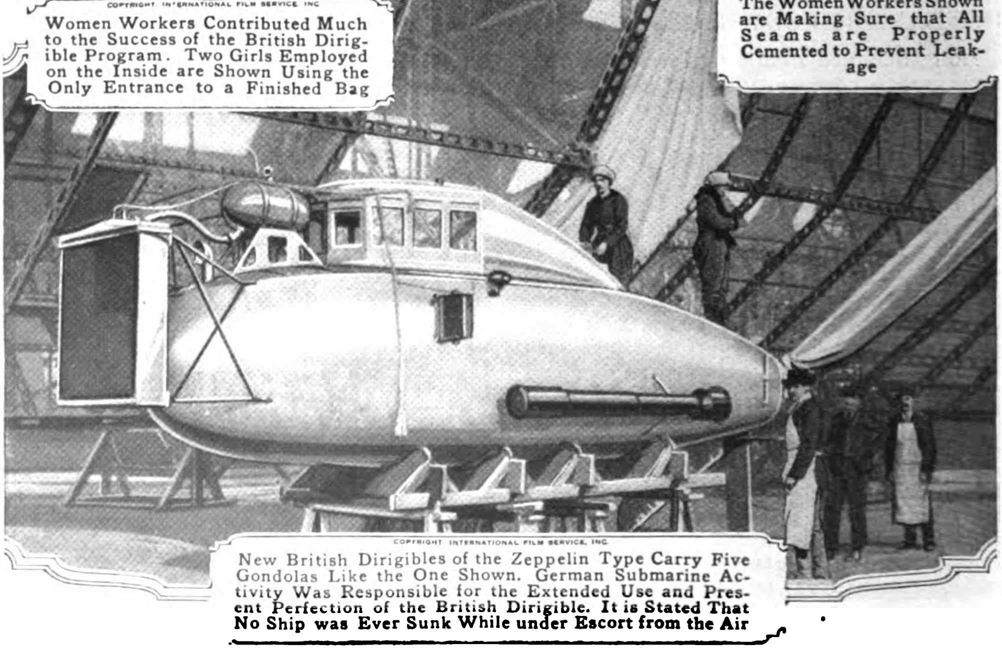
Women Workers Contributed Much to the Success of the British Dirigible Program. Two Girls Employed on the Inside are Shown Using the Only Entrance to a Finished Bag



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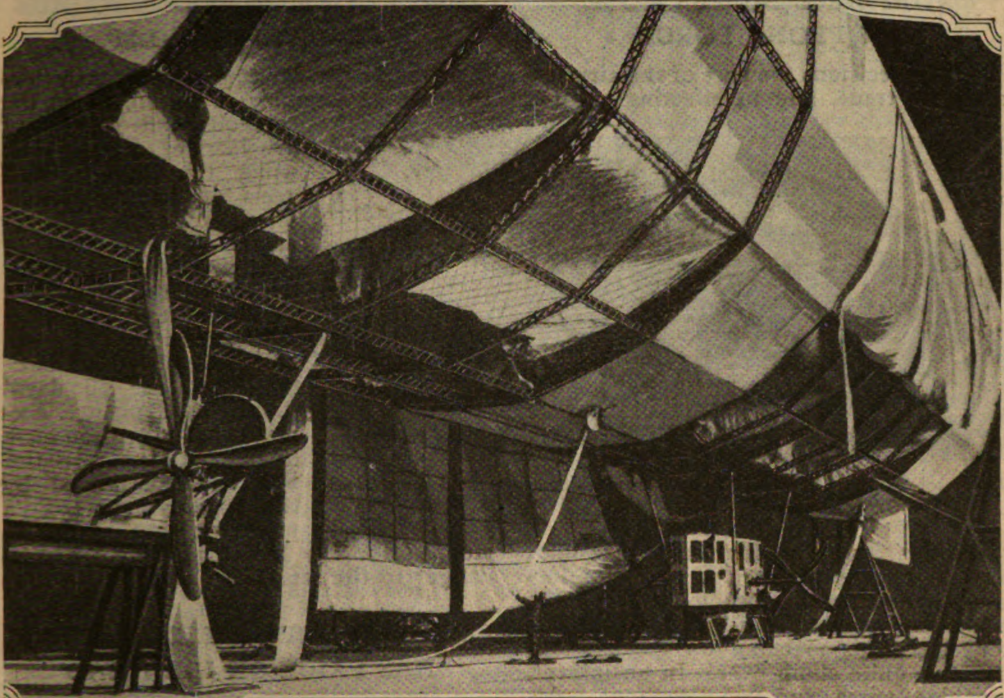
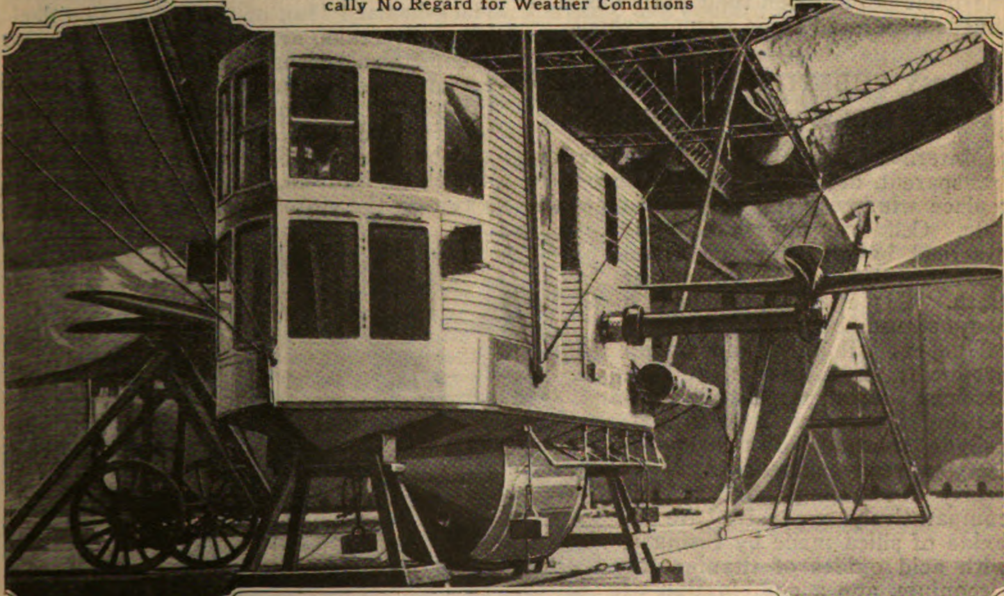
New British Dirigibles of the Zeppelin Type Carry Five Gondolas Like the One Shown. German Submarine Activity Was Responsible for the Extended Use and Present Perfection of the British Dirigible. It is Stated That No Ship was Ever Sunk While under Escort from the Air

READY FOR POSTAL AND PASSENGER SERVICE



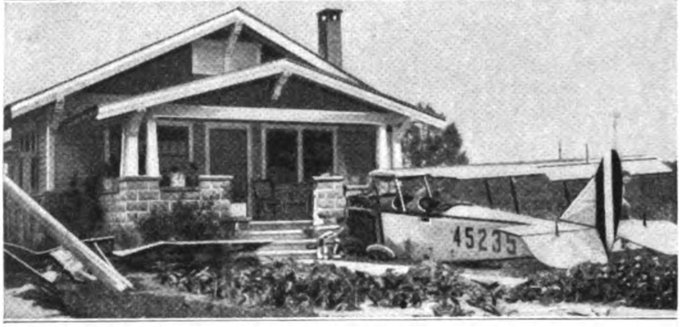
The Outer Coverings have been Partly Removed from This British Dirigible, Showing the Rigid Frame and Separate Gasbags. It is Stated That a New British Airship with a Length of 665 Feet can Travel to America and Back without Landing for Fuel, and with Practically No Regard for Weather Conditions



A Closer View, Showing One of the Power-Generating Cabins Slung under Britain's New Super-Zeppelins, with Which Transatlantic Passenger Service may Soon be Inaugurated: It will be Noticed That the Propellers on This Cabin Are Adaptable to Either Driving or Elevating

AIRPLANE BURIES NOSE IN FRONT PORCH

Quick decisions are part of the airman's stock in trade, and in effecting a tardy take-off from a muddy field, this pilot had to choose between a row of interested spectators in automobiles, and the telephone wires. He decided for the latter, nosed his machine up quickly, but couldn't quite climb over. In an instant, machine, wires, and two telephone poles were across the street and on the ground. The airman stepped out unhurt, but the tenants of the house, who were sitting on the front porch when their yard was thus invaded, suffered some nervous shock.



The Pilot of This Machine Chose between Spectators and Telephone Wires with the Result Shown. Losses Included One Wing, One Propeller, and a Pair of Landing Wheels

MANY SUBSTITUTES REPLACE EUROPE'S BROKEN GLASS

Materials of many kinds, more or less transparent, are being tried in Europe to replace window glass, which is unobtainable. Cellulose films are made practical by mounting on metal gratings, light wire screen, or cloth. Glue interlaced with hemp strands between two sheets of paper; albumen and casein products; sheet gelatin, and an artificial resin made by condensing phenol with a formaldehyde solution, all are imperfect but ready makeshifts. More nearly resembling glass, but comparatively expensive, are an oxide of silica made by fusing it with acid oxides of titanium or zirconium, and a combination of greensand marl with magnesia, bauxite, and an alkali, melted in an electric furnace. Some of these glass substitutes are flexible.

CONCRETE ENGINEER RECORDS RESULTS ON FILM

An authority on concrete recently lectured to an assembly of engineers on the methods and results of five years of experiments, using two and a half reels of moving-picture films to illustrate his remarks. One section of the film was unusually interesting, as it showed a slow "setting" process that necessitated the use of a motor-driven camera to record the 50 days' continuous exposure. Explanation and discussion of interesting bits of the film were permitted by the employment of a projector that could be stopped for any length of time with no danger to the sensitive film.

FARMER'S FOE, CARRION CROW, HAS PRICE ON HIS HEAD

Though many of the agriculturist's ancient aversions have been changed to amity, against the carrion crow the old charge still stands; he is the destructive, black-hearted Hun of the fields. To decimate his ranks, always a duty, is now to become also a pleasure and a game. Farmers and sportsmen will line up together this year in a national crow-shooting contest, in which gold, silver, and bronze cups, and buttons will be awarded to the most successful hunters. There promises to be a run on the store supply of crow calls.

One Gun, One Morning, 25 Crows—That Helps to Reduce the Farmer's Menace. A Common Crow Call Brings Them In, and the First One Killed is Set Up as a Decoy

COMMENT AND REVIEW

[These pages were printed March 24, 1919]

The Transatlantic Air Voyage

EVEN before this page can be printed and reach its readers, there is a chance that the first transatlantic air voyage will have been made. France was the first to announce an attempt, which unfortunately had to be deferred, owing to a cracked cylinder. England is working desperately to get an airship ready, and it is understood our own War Department has hopes also of being the first across. It is to be hoped the feverish anxiety, though quite natural and commendable, will not lead either of the contestants to undertake the trial until every possible effort has been made to insure success. There are dare-devil "airnats" in plenty ready to make the attempt even in the face of a minimum of chance of success, but let us hope that success is guaranteed in advance, so far as such a thing is possible.

Crossing the Atlantic in a plane today really seems less of an undertaking than crossing the English Channel did at the time Blériot did it for the first time. There is a great difference in the two flights, however, even after allowing for the improvement in air craft since that day.

As the birthplace of the aeroplane, it would be most gratifying to Americans to have the honor of the first flight, which will be an epoch in history deserving a place alongside the first locomotive and steamship. Our conduct of aeroplane affairs, however, ever since Wilbur Wright made his first flight, does not warrant any great expectations. We hope to win, but shall be very proud of the Frenchman or Englishman who carries off the honors.

There is doubtless no other one thing of a commercial nature which seems to combine so many unknown possibilities for good and evil as the trans-ocean airplane. With its accomplishment, which apparently is assured, we become the next-door neighbors of the other nations of the world, with the same liability of interference. The oceans, once our confident bulwark from attack, no longer protect; and when the air becomes an international thoroughfare, we can no longer hold back, we can only defend. With the air definitely conquered, the world becomes practically a city block; and with so great a decrease in immunity, let us hope for a corresponding hesitancy to start a conflict.

The theories as to air currents and atmospheric conditions, favorable and otherwise, which the first flight will reveal, are many and conflicting. The probability, however, is that the voyage will show less difficulty from these sources than expected, and will more likely be reduced chiefly to engine performance, which, like other mechanical details, is capable of correction and improvement.

And so the next few months will bring events of as thrilling interest as any battle of the war, and likewise fraught with possibilities no less portentous and momentous.

* * *

An Encouraging Prospect

SPRING is here and with its advent has come a most encouraging resumption of peace-time activities. There are spots, like New England and the upper Mississippi Valley, which have responded less freely, but these, too, will shortly fall in line.

The boys back from France, who were on the firing line on that memorable eleventh day of November, tell of the remarkable sensation which came when the big guns were suddenly hushed, and the quiet that followed which was almost painful in its intensity. It was many hours before the men were able to adjust themselves to the new condition. The industries of our country experienced a very similar state, with this difference: Where the individual was able to bring himself to the readjustment in a few hours or days, business, by reason of its greater complications, has required five months. Even at that, the period has been surprisingly short.

This does not mean that we are back on a peace basis by any means, but it does mean that the wheels of activity have already begun to turn, and each day means a speeding up of those already started, and more and more of others.

Not all the men who have returned to civilian life have yet been able to place themselves as desirably as when they left to enter war service. The assimilation is rapidly progressing, however. In some concerns, many of the female workers, instead of being discharged when soldiers returned to their former positions, are being retained by the same employers in other positions. When we consider the tremendous upheaval and disarrangement of established working conditions, the marvel is that readjustment has progressed as far and as rapidly as it has. An employed, busy nation has the main essentials for contentment, happiness, and prosperity, and our outlook is assuredly a most inviting one. The crop prospects are unusually good, with a certain demand at good, though reduced, prices for all foodstuffs both at home and abroad. There will be a sure market for everything we can raise this year, and the essentials for home gardens and intensive production are almost as important as a year ago. With the former restrictions as to the free use of foodstuffs removed, it would be a pity if we returned to the needless and criminal waste of former years.

Normal Prices Returning

ONE statistician has estimated that there are in this country today constructive expenditures totaling five billion dollars, which are hesitating to begin on account of the high prices of materials and labor. It is evident that an individual or corporation is reluctant to erect a building which today will cost him $100,000, if he feels that six months or a year hence he can duplicate the same identical structure for $60,000 or $70,000. However, there is a certain patriotic element in all this, and if everybody waits for the bottom price, we will all suffer from the inevitable stagnation, and complete resumption will be indefinitely postponed. The policy of the founder of the Rothschild banking house, which was to buy securities neither at the lowest price, nor to sell at the highest, and which the baron demonstrated so successfully, is not a bad one just now. There is, moreover, the probability that a building, erected at more than the normal cost, may furnish the opportunity for conducting, for some years at least, a business at profits which will warrant the unusual expenditure. There is always a "happy medium" somewhere between the abnormally high and abnormally low, which is usually difficult of determination, but which is warranted and advisable.

Some building materials have already fallen in price; a substantial reduction in many others will doubtless produce greater profits at the end of twelve months, by reason of increased sales, or sales which would otherwise not be made at all, than by trying arbitrarily to maintain war prices, which is ultimately impossible. The Sales Department of the War Department, which has the disposal of hundreds of millions of dollars of raw and manufactured products, bought for war purposes and no longer needed, has already arranged for the release of certain commodities. The lumber associations have been authorized to commence the sale of the vast quantities of lumber on the Government's account and expect to clean up the entire surplus in six months. The copper interests, representing 90 per cent of the American producers, expect to dispose of the Government's holding of copper in fifteen months, or less. Sodium nitrate and hardwood lumber are also now ready for release. Other lines will follow as rapidly as arrangements can be made, and all without "breaking" the market, though prices will naturally be less than war-time prices. A fair start has been made toward settlement with the thousands of contractors and subcontractors, although the process is less rapid than could be desired. On the whole, we are recovering from conditions of the "day after" quite as rapidly as should be expected.

Undue Credit to Germany

AS a prelude to her attack on civilization, Germany did two things. For forty years she built up a vast military machine at home, and for forty years, through well planned and skillfully executed propaganda throughout the world, she taught the gospel of her superior efficiency. This latter to such an extent and so successfully that, by 1914, to use an expressive though slangy expression, she had the world "buffaloed."

This is not to say Germany was not efficient, nor superlatively organized, for she was. Not only was the theory of efficiency talked on every occasion, but it was demonstrated in her manufactured products and the thoroughness of her immense export trade. If a German manufacturer could not compete in any foreign port with any article made elsewhere, his government promptly came to his relief with lower ocean freight rates, or some other form of subsidy. The natural result of all this was to create and foster a world-wide conviction that Germany was a supernation, head and shoulders above all others, and therefore impregnable. To resist Germany when she set out to conquer was to invite and insure disaster. In short, the expectation was to destroy in advance a world morale, and thus reduce successful conquest to its simplest terms.

This system was not without its results and effect. The German at home, and with few exceptions abroad, was absolutely grounded in the conviction that the fatherland was invincible. We can each recall those Germans in this country, including those who had been naturalized here for many years, and who eventually took sides with the United States against Germany, who in 1914, 1915, and 1916 were both indignant and angry at any suggestion of German failure, or of responsibility for starting the war.

It is quite true that, in the early days of the struggle, victory perched on German banners, and the tide of battle flowed one way. This apparently was proof of the claim of supernation. What with millions of men with years of the most severe military training; guns with undreamed-of range, throwing shells of unheard-of size; new explosives of unequaled power and violence; airships; submarines; gas shells; liquid fire, and all the other new-in-civilized-warfare weapons, the claim apparently was established. The world seemed voiceless to refute the assertion.

Then gradually—so slowly at first there seemed no progress whatever—the allies began where Germany had commenced forty years ago, to gird up their loins. It was slow work—that of fighting a defensive battle against vastly unequal odds with one hand and building an offensive with the other. The conditions were supremely hard, for it is one thing to plan and invent and experiment and construct and test out, all under the conditions of peace, and quite another to commence at the foundation to do the same when carrying on a war.

In only a little more than four years, the allies had searched out and organized their inventive and scientific minds, their chemists, their builders of guns and submarines and air craft, and had brought their fighting machinery—with the exception of the 76-mile gun—up to the standard which Germany had required forty years to accomplish, and in some respects had gone even better. With the advent of the United States came a tremendous impulse of inventive accomplishment which in scarcely more than a year had conceived, and made in vast quantities, weapons in comparison with which the German type was as a child's toy.

Many of these things are still a secret in the archives of our War College; their details or even their existence have not and should not be made public; but it is permissible to mention one, a gas shell, the use of which will absolutely and almost instantly annihilate any army into whose ranks it is hurled.

Had the armistice been delayed only a few days, there would not have been left alive a single soldier in all the Metz fortifications. A few planes hovering so far above its guns as to be mere specks in the sky; a few gas bombs dropped among the forts, and a few moments later, not a living soul left to challenge or surrender. And this shell, the result of only a few months' effort, makes the German preparation of forty years as the snail is to a hare.

These words are not written for the purpose of any self-laudation of what the allies accomplished chiefly in thirty-six months, although deserved. History will emphasize this fact far beyond what the most of us realize today. The essential thing we should grasp is, not to permit ourselves to accept in future as we have in the past, without question, what is declared to us by Germany, for there is every reason to believe that a country which found its deceptive propaganda so profitable in years gone by is not going to abandon its formula when we once more settle down to peace conditions. We may, with equal advantage, each one for himself, question the integrity and motive of many statements which are made with so much assurance, and which we meekly accept without any other proof and authority than that of the speaker's word. If what we are urged to believe is so, it is capable of proof; if the evidence does not support the statement, we simply delude ourselves.

Does anyone imagine that, if the German people who were alive on that fateful August day, 1914, could have known what is known now, they would have gone into the war?

H. H. WINDSOR

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VICTORY OF PRINCETON COMMEMORATED

A sculptured group, 26 ft. in height, will stand at the base of a 50-ft. shaft to be erected on the green at Princeton, N. J.

COPYRIGHT, G. KAWAMURA

This Figure of Washington will be Erected on the Scene of a Victorious Surprise Attack during the Revolutionary War

The event commemorated is the surprise attack made here at daybreak, Jan. 3, 1777, on a part of Cornwallis' forces by the patriot army. The engagement was fought stubbornly, but the Americans finally triumphed, thus ending a long series of discouraging misfortunes, and inaugurating the campaign which drove the British from nearly all of New Jersey.

THREE MESSAGES AT ONE TIME ON ORDINARY TELEPHONE

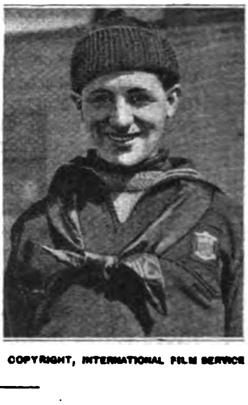
Even the multiplex telephone, announced in Popular Mechanics last March, isn't wholly new in its achievement. It is related that a Brazilian newspaper has been enjoying for some time the privilege of carrying on three simultaneous conversations over a single, ordinary telephone circuit. With three telephone sets at each end of the line, one pair of users talks English, one pair French, and one pair Portuguese. Out of this polyglot complex, which the telephone diaphragm triumphantly passes on, the listeners seem to find no difficulty in selecting the sounds intelligible to them and ignoring the others. The newspaper people express great satisfaction with the result, especially as they pay for only one line.

SEAPLANES FOR FOREST-FIRE PATROLS

"Seaplanes for Forest-Fire Patrols" reads like a printer's blunder, but it really represents a movement now on foot in Canada and northern Michigan. The value of aerial observation in conserving our valuable timber reserves is evident; and the necessity for the use of seaplanes becomes so when a map is consulted. It is revealed that hundreds of lakes dot the territories the airmen would patrol, thus furnishing ideal landing places for small flying boats. Many former forest rangers from both sides of the international boundary have become military fliers, and, on discharge, should furnish an excellent nucleus for a service of this sort.

SAILORS IN MERCHANT FLEET HAVE OWN UNIFORM

Gobs on the Shipping Board's training vessels now have uniform markings of their own. Instead of the regulation three narrow white stripes on the blouse collar this merchant sailor wears two broad ones. The Shipping Board insigne on the blouse pocket is most distinctive, however, as nothing of the sort is worn in the navy.



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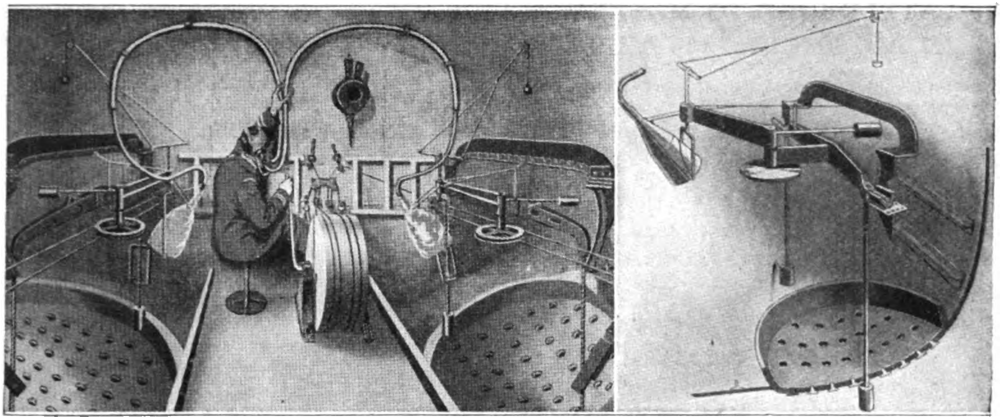
A great shortage of magazines, for the use of soldiers in camps and hospitals, is reported by the American Library Association. Recent issues of magazines not bearing the "one cent notice" on the cover usually may be sent through the local library. The May Popular Mechanics bears the notice, however, and may be forwarded through the mail if a one-cent stamp is affixed.

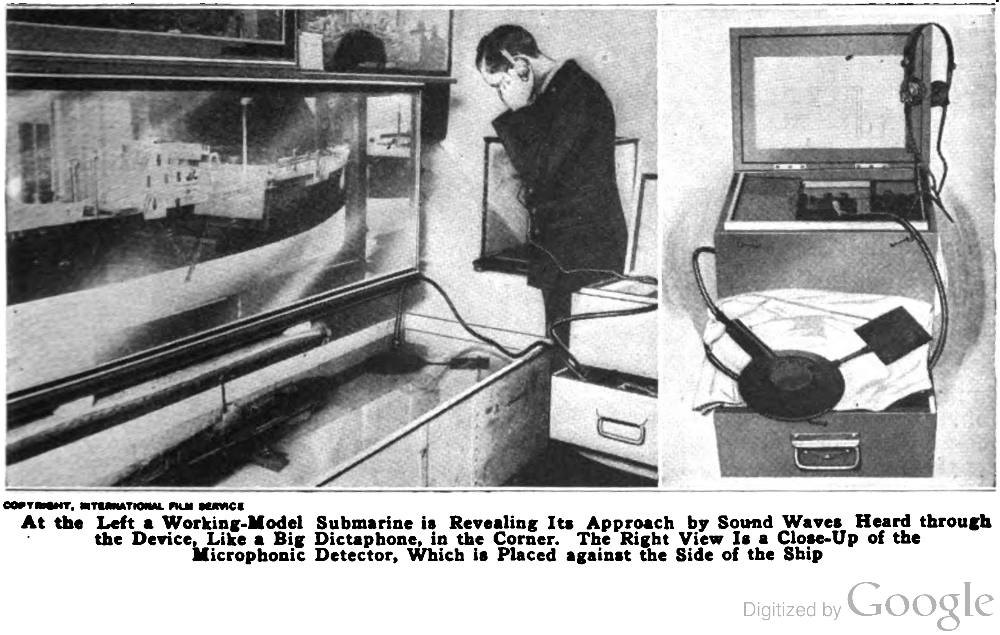


The Observer's Use of Sound Trumpets, Direction-Finding Drum, and Small Diaphragms in the Ship's Sides is Made Plain by the Left Picture. The Diagram at the Right Indicates How the Parts are Correlated for the Detection of Enemy Submarines

HYDROPHONES ON SHIP DETECT PRESENCE OF ENEMY CRAFT

Water transmits sound better than air, and instruments for locating submarines which made use of that fact were most successful. One French device that did splendid work took the form of a rounded projection or "blister" on the ship's hull below the water line, one on each side replacing a section of the plating. Numerous perforations in these convex iron plates were closed by diaphragms. Inside the ship sound-collecting trumpets were suspended, facing the concavity of the "blisters." These were connected by tubes to earpieces in the observer's helmet. When the telltale vibrations were heard, the trumpets were swung to different angles by turning a drum. At the point of loudest sound, graduations on the scale indicated the direction of the disturbance with great accuracy. Another successful device, electrical in its nature, resembled a magnified dictaphone. It was not a part of the ship, but was placed in any selected location.

¶To reduce army overseas foodstuff reserves to 45 days' supply, large sales have recently been made to the French and Belgian governments, the strongest demand being for evaporated milk.



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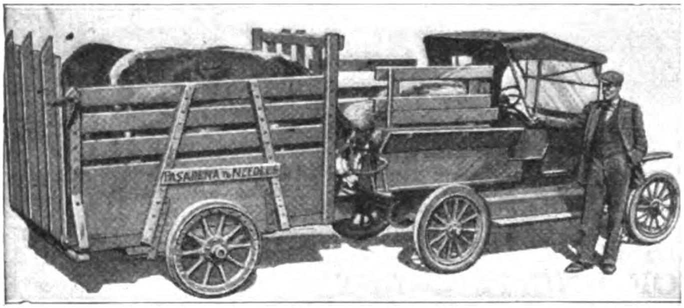
At the Left a Working-Model Submarine is Revealing Its Approach by Sound Waves Heard through the Device, Like a Big Dictaphone, in the Corner. The Right View Is a Close-Up of the Microphonic Detector, Which is Placed against the Side of the Ship

CATTLE RIDE TO MARKET IN AUTOMOBILE TRAILER

An enterprising cattle dealer who lives far from town takes his cattle to market in a vehicle of his own design. Two 1,000-lb. cows travel safely in a stout trailer, with no stops for meals. Dining-car service is furnished by the back of the auto, carrying hay which the animals can easily reach through an opening in the trailer body. As a result of the quick trips thus made possible the cattleman expects a larger income this year.



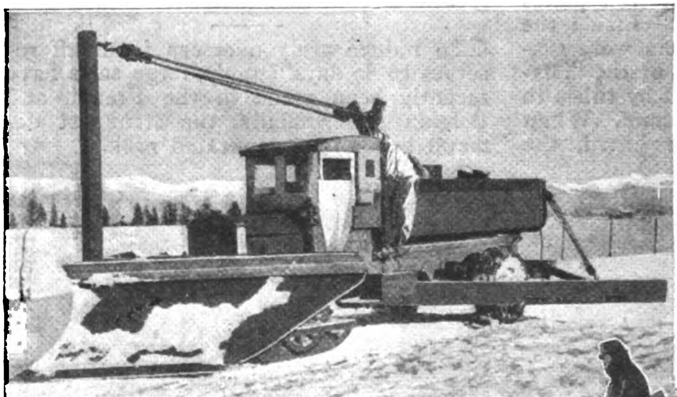
These Cows Make No Stops for Meals for There Is Plenty of Hay within Reach on the Rear End of the Automobile. The Cattleman Reports Quick Trips and Larger Profits

ARMY TRAINING PLANES TO BE STORED

As part of the return to a peace-time military basis the War Department has decided to retain 16 flying fields and three balloon fields, using only two for actual instruction purposes. Many elementary and advanced training planes will thus be superfluous, but it is believed that there is no immediate prospect of radical change in airplane design, and that the planes may be stored for a number of years without danger of deterioration.

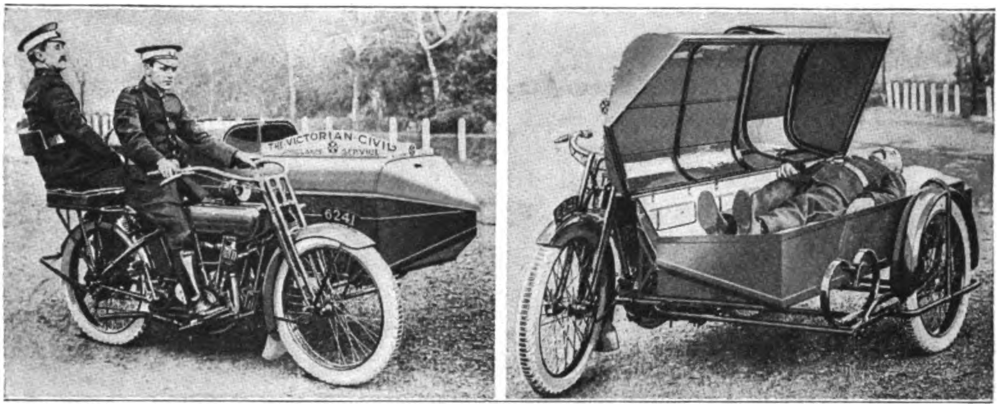
MOTOR-TRUCK PLOW CLEARS HIGHWAY OF SNOW

To turn a five-ton motor truck into an efficient snowplow requires some ingenuity, but officials of a Montana county solved the problem and have kept their highways passable to automobiles all winter. First, cleats are bolted to the truck's rear wheels for traction. Then wooden runners with half-inch steel edges are fastened to the front wheels. A V-plow of sheet-tin plate on a 2 by 4-in. timber frame is bolted to a heavy beam on the front of the truck. A six-inch mast at the plow point is used to raise and lower the point by tackle from the truck body. From the sides of the body spreader boards angle out, to smooth away the snow piles left by the plow; these also are adjusted by block and tackle.



Snowplow Attachment for Motor Truck: Observe the Spreader Boards, Runners on Front Wheels, and Mast for Adjusting Point

Rear View Gives a Better Idea of the Work Done by the Plow Point and Spreaders. The Traction Cleats on the Rear Wheels May be Seen Here



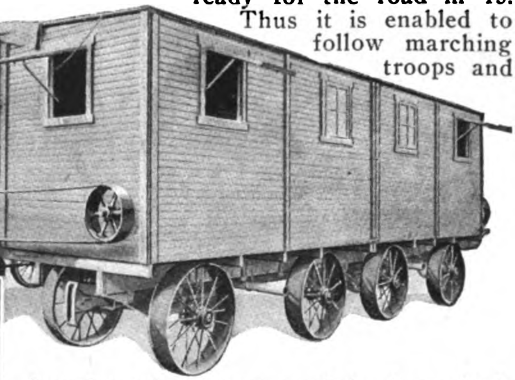
This Comfortable Motorcycle Ambulance Carries a Hospital Attendant and a Surgeon to the Scene of the Accident. The Sidecar is Fitted to Receive the Stretcher, Thus Causing the Sufferer a Minimum of Discomfort

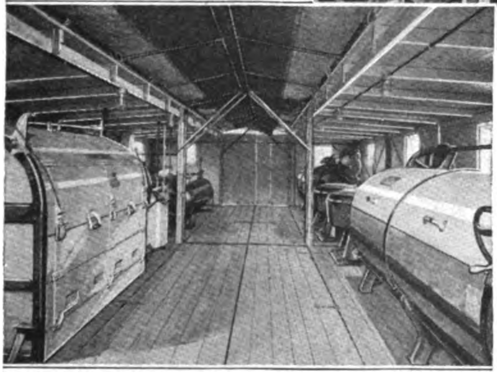
SIDECAR AMBULANCE FOR HURRY CALLS

Motorcycle ambulances saw some service on European battle fields, but it was left to an Australian city to develop the machine for civil use. The only radical departure from usual sidecar construction is in lengthening the chassis to give more spring suspension for the long car, and in mounting the third wheel between two sets of perpendicular opposed coil springs. To secure further comfort for the patient, the stretcher is made removable; a hinged, ventilated top is provided, and a tandem seat is added in the rear to carry a surgeon or nurse.

STEAM LAUNDRY FOLLOWS MARCHING TROOPS

An efficient mobile laundry unit furnishes another example of government war-time enterprise. Hauled by a tractor in a train of four cars, at a speed of three and a half miles per hour, the establishment may be assembled and ready for work in 20 minutes, or disassembled and ready for the road in 15. Thus it is enabled to follow marching troops and function where most needed. Assembled, the working space is about 20 by 24 ft., giving ample room for the modern appliances used. Steam for washing, as well as power for the machines and the lighting dynamo, are supplied by the same tractor that pulls the train. It is claimed that the work done by this compact little plant excels that of many small-town laundries of twice its size.

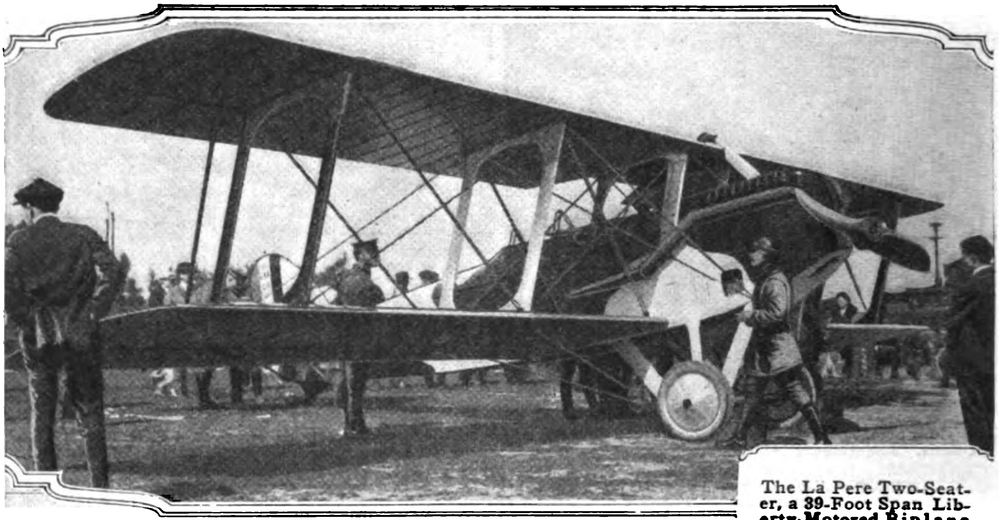




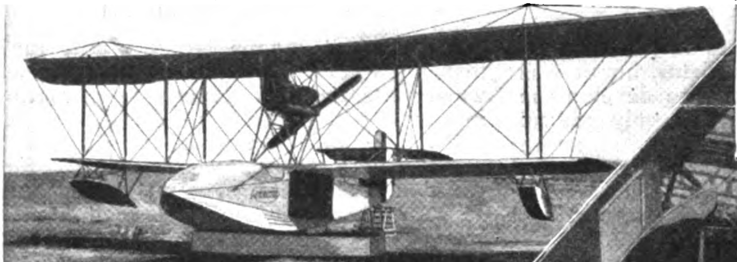
This Is the Interior of the Military Laundry That can Follow Marching Troops. The Exterior View, Above, Shows How the Four Sections of Which the Laundry is Made Up are Assembled, and How the Power is Applied to the Washing Drums. The Inside Space Measures About 20 by 24 Feet, Giving Ample Room for Machinery and Workers

¶Official warning is given that the American army gas mask, designed for protection in the open air against a few specific gases, is useless for the majority of commercial and industrial purposes.

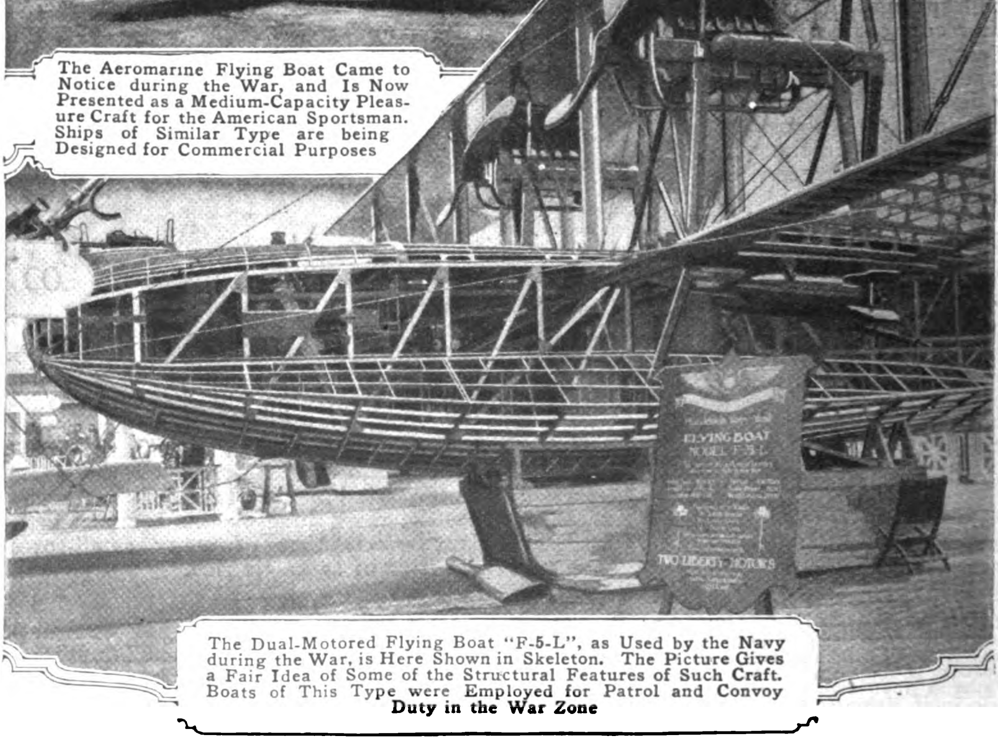
SEVERAL INTERESTING TYPES OF AMERICAN



The La Pere Two-Seater, a 39-Foot Span Liberty-Motored Biplane Developed Late in the War for the Government: It Bears the Name of Its French Designer and According to Some Reports Has a Ground Speed of 136 Miles an Hour

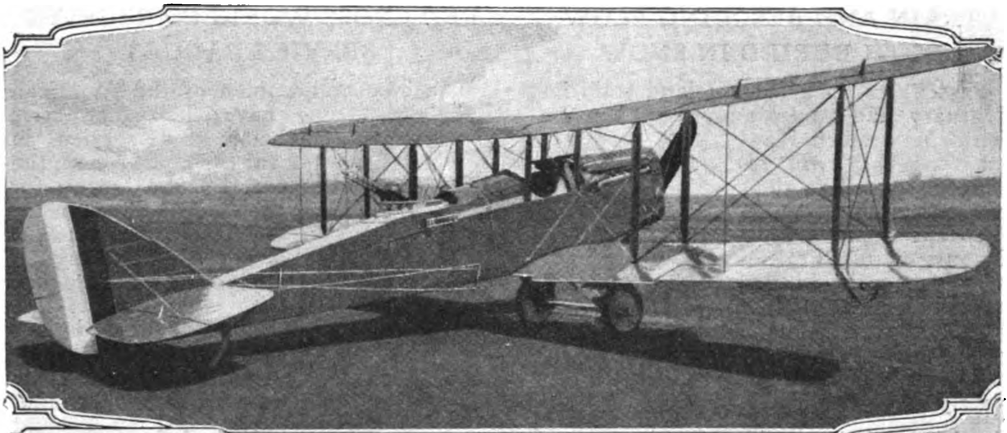


The Aeromarine Flying Boat Came to Notice during the War, and Is Now Presented as a Medium-Capacity Pleasure Craft for the American Sportsman. Ships of Similar Type are being Designed for Commercial Purposes

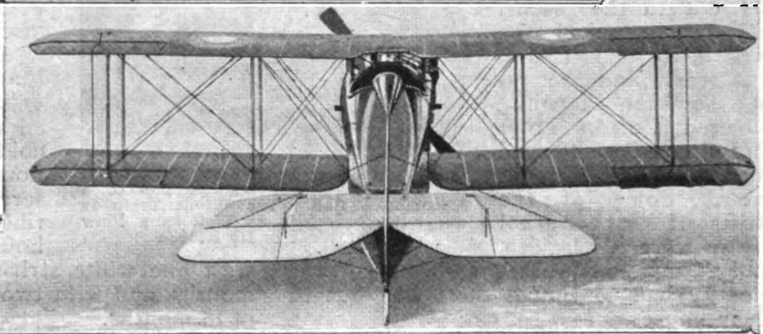


The Dual-Motored Flying Boat "F-5-L", as Used by the Navy during the War, is Here Shown in Skeleton. The Picture Gives a Fair Idea of Some of the Structural Features of Such Craft. Boats of This Type were Employed for Patrol and Convoy **Duty in the War Zone**

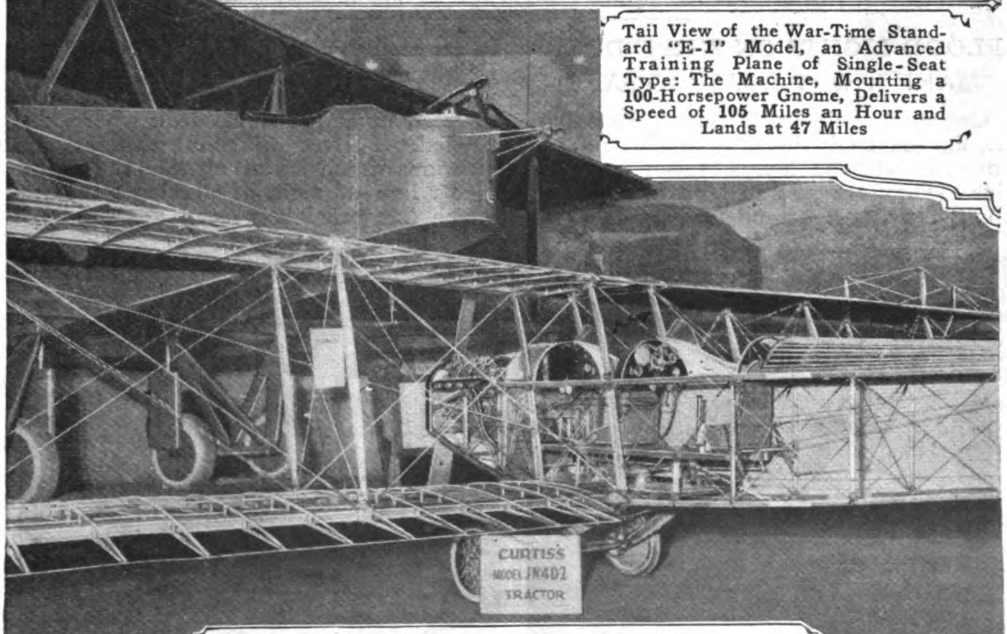
WAR-TIME AEROPLANES AND FLYING BOATS



This Photograph Shows a Plane That Is of Interest Chiefly for Historical Reasons. The Original De Haviland "4" Mounting the Original 12-Cylinder Liberty Motor. It Is to be Preserved at the Smithsonian Institution at Washington



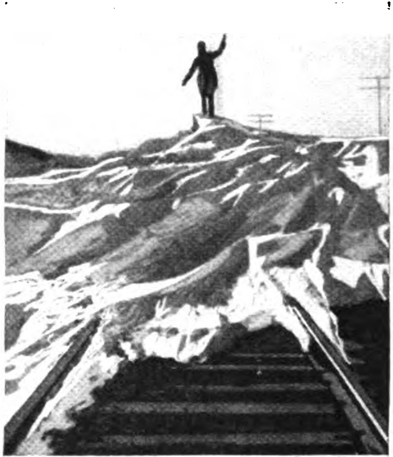
Tail View of the War-Time Standard "E-1" Model, an Advanced Training Plane of Single-Seat Type: The Machine, Mounting a 100-Horsepower Gnome, Delivers a Speed of 105 Miles an Hour and Lands at 47 Miles



The Curtiss "Jn-4D-2" Tractor Training Plane Shown in Skeleton: This Is a Slow-Going Two-Seater with Dual Control. It Has a Span of 43 Feet and Carries a Useful Load of 550 Pounds. A Large Percentage of America's Army Pilots Received Initial Instruction in Machines of This Type

TRAIN AND RESCUING PLOW BOTH BURIED IN SNOW

Passengers on a Rock Island train last February had an experience with snowdrifts in western Kansas that they will remember to tell to their grandchildren. In a deep cut between Phillipsburg and Prairieview the train headed into a drift on a black night, with a 60-mile gale blowing. By morning the train was completely buried in snow. A snowplow, which set out to the rescue, valiantly attacked the huge drift; but it soon got stuck, and the flying smother of white covered it also. Train and plow were shoveled out by hand 24 hours later. Some of the drifts of that unusual storm were 30 ft. deep, and farmers and other residents of the vicinity had to tunnel their way out of their houses.



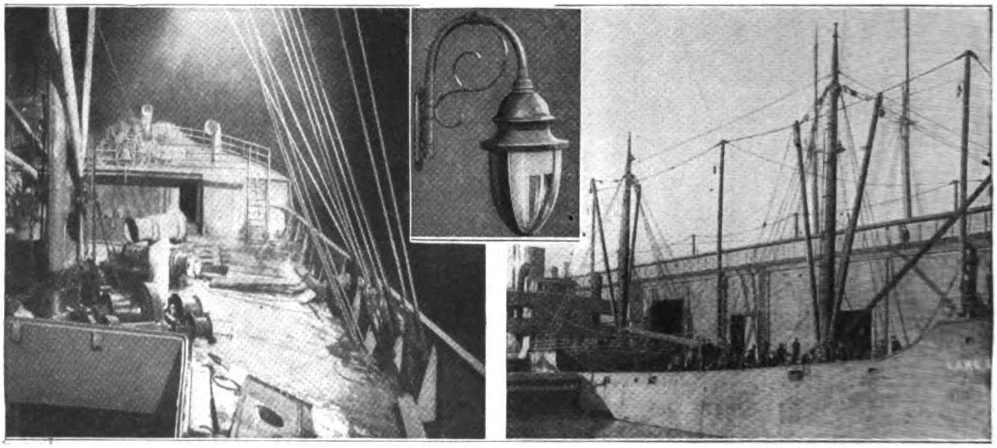
One could Never Tell It, but the Man in the Picture is Standing on Top of a Locomotive Cab. The Whole Train Is under the Snowdrift, as Well as a Plow That Went to Its Rescue

RED CROSS WORKERS RECEIVE SERVICE BADGES

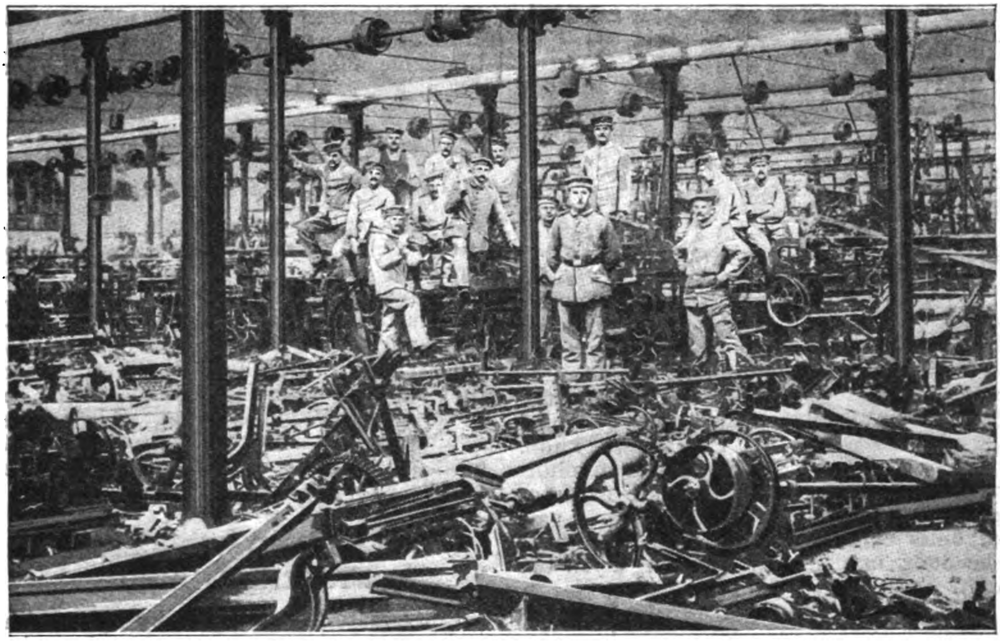
The men and women of the American Red Cross now have their distinctive badge for service in war time. For men, the emblem is a button for the coat lapel; for women, a similar but larger disk is hung by a blue ribbon to a bar with safety catch. The design of both is the same, however, consisting of the Red Cross on a white background, surrounded by a band of blue on which are inscribed the words "Service. American Red Cross." The women's badge has the added feature that the color of the ribbon announces the length of service. The plain blue ribbon denotes 800 hours in six months; with one white stripe, 1,600 hours in 12 months, and with two stripes, 2,400 hours in 18 months.

FLOOD LIGHTS ON SHIPS' DOCK MAKE NIGHT LOADING SAFE

One of the docks at South Brooklyn, N. Y., has lately been equipped with 14 powerful electric lamps, seven on each side. They are mounted on poles 60 ft. above the pier floor and far enough apart to range the entire deck length of a large freight ship. The dock side of each lamp is masked, so that all the illumination is directed upon the ship's deck where it is needed. Perfect diffusion of light and location of the lamps outside the workmen's line of sight eliminates all glare, which has previously been the cause of



New Form of Light for Ship Docks: The Insert Shows the Lamp in Detail, While, at Left and Right, Are Views of the Installation on a Brooklyn Pier, Indicating Strong Illumination of the Ship's Deck



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Here Is a Typical Hun Wrecking Crew Busy with Their Sledge Hammers in a French Factory. Germany Took This Means of Creating a Market for Her Textile Machinery

several accidents. The new lamps effectively illuminate a radius of 250 ft., making night loading and unloading operations as satisfactory as day work.

DAYLIGHT EXACTLY MATCHED WITH POLARIZING DEVICE

When a scientist desires to secure an exact reproduction of daylight from artificial sources, he generally uses screens or light filters. A method recently developed makes use of the Nicol prisms of a polarizing apparatus. Crystalline quartz is placed between the crossed prisms, its thickness and the angle of the adjustment being varied according to the nature of the artificial light. Using this equipment, an accurate imitation of daylight is obtained. The method, however, is obviously limited to the illumination of comparatively small areas.

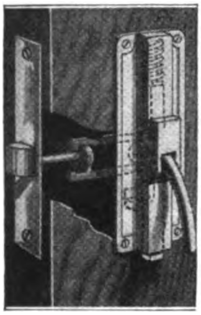
DOUBLE PURPOSE PROVED IN GERMAN VANDALISM

The expression "wanton destruction" is often employed to describe German methods in Belgium and northern France. But the terrific wrecking of industrial life in these countries was not "wanton"; it was the result of deliberate, careful calculation, which intended not only the annihilation of French industrial life, but also the use of German machinery in reconstruction. Thus, after discussing the havoc wrought in France, a German report goes on to say, "If the commercial relations between France and Germany [after the war] are sufficiently favorable, an opportunity of tremendous importance, notably the erection of German textile machinery, ought to offer itself in northern France."

SHIPS' DOUBLE BOTTOMS PUT TO WORK

For many years a few steamships from the Far East have brought fuel oil back to Britain in the ballast space between their inner and outer hulls. The practice never became general, however, and "tankers" continued to handle the bulk of the trade. But in June, 1917, increased submarine activity and the expansion of the allied fleets made immediate additions to tank tonnage so imperative that not a few, but hundreds of British and American "double bottoms" were fitted for this auxiliary cargo. Apart from its war-time results this new practice has taught marine engineers many lessons that will guide them in designing the oil-burning ships of tomorrow.

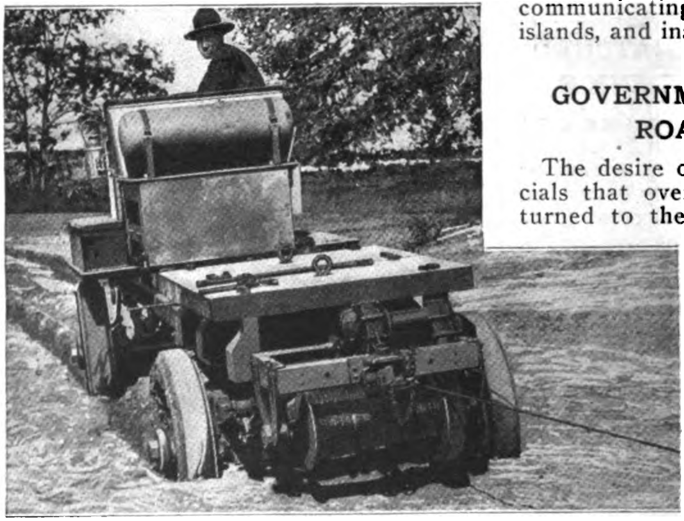
IMPROVEMENT IN DOOR LOCKS TO PERMIT HURRIED EXIT



Exit doors of theaters, schools, and like gathering places, must normally be kept locked, and are therefore of little avail in case of panic, unless specially designed locks are provided which open the doors upon pressure from the inside. A recently marketed device of this kind has a pivoted plate curving outward and downward at the point usually occupied by the door knob. Voluntary or involuntary pressure against this plate actuates either an ordinary form of lock or a pair of bolts arranged at top and bottom of the door, immediately throwing open the exit.

WHEEL TRACTION IMMATERIAL TO TRUCK WITH WINCH

Slippery, hub-deep sand and semiperpendicular grades had no terrors for a motor truck, of which several army models were made, equipped with a winch mounted behind the rear axle on an extension of the frame. When the end of the cable from the winch was attached to some solid object the truck progressed backward over or through almost any kind of surface. With its brakes locked, the cable and winch served to pull other vehicles across the same difficulties.



Rear View of Motor Truck Equipped with Winch, Which is Seen in Position on an Extension of the Frame: The Incased Driving Gear Is Visible Just above the Winch. The Cable, as may be Seen, Pays Out behind the Truck

CAFETERIA PLAN SELLS WOMEN'S APPAREL

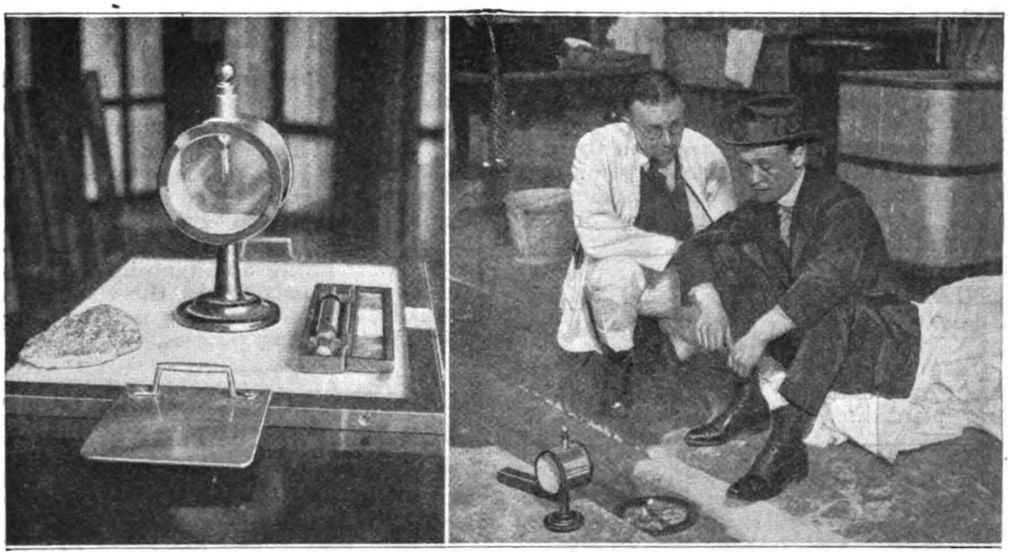
Signs replace salespeople in a city "dresseteria" now successfully selling women's ready-to-wear clothes. Unattended and unhurried, the customer examines the articles in which she is interested and makes her purchases. She may have help, however, as a sign informs her that an employe will be glad to assist in selection if invited to do so. Her choice made, the customer turns to a central desk, where the sale is concluded and the bundle wrapped.

WIRE AND WIRELESS SYSTEMS LINKED

Conversation between a city home with ordinary telephone equipment, and an airplane in the clouds above it, is forecast by a reported method for connecting wire and wireless systems. The originators do not believe that wireless telephony will ever supplant the present wire system entirely, but they hold that it has its use in communicating with ships, moving trains, islands, and inaccessible places in general.

GOVERNMENT BACKS GOOD-ROADS PROGRAM

The desire of many state-highway officials that oversea road engineers be returned to their jobs in this country is another evidence of the growing demand for more and better roads. Despite present costs of road-building material and labor, it is expected that a total of more than half a billion dollars will be spent for this purpose in the next year and a half, giving work to more than 100,000 men in addition to those employed in the production of materials. The Federal share of this program already is assured by the passage of the recent post-office appropriation bill by which an expenditure of $209,000,000 for highways is provided.

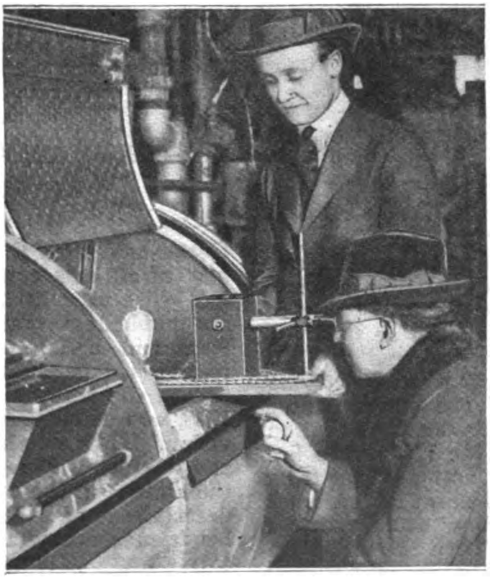


In the Center of the Left Picture Stands the Gold-Leaf Electroscope, While at Its Right Is the Charging Device in Its Case. In the Left Corner Is a Fragment of Willemite. The Right-Hand Picture Shows the Investigators in Cook County Hospital Laundry, Watching the Electroscope

HUNTERS OF LOST RADIUM USE ODD TOOLS

By PAUL H. WOODRUFF

MAKING a wireless receiving station out of a gold-leaf electroscope; watching the inside of a small, dark box with a microscope; holding a queer-looking mineral fragment close to suspicious lurking places; these are some of the mysterious methods practiced by the professional hunters of lost radium. For with the constant use in busy hospitals of radium capsules no larger than a diamond, and many times more valuable, there are bound to be occasional losses. It is the task of the insurance underwriters to recover the missing particle if possible, and they have learned to take advantage of all its extraordinary properties to make it reveal itself.



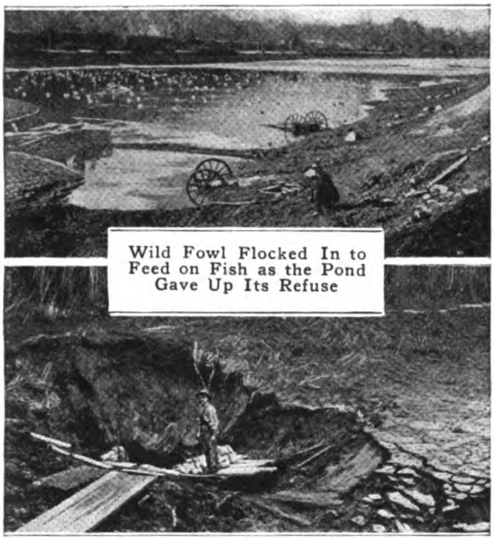
Testing a Suspected Washing Machine in the Hospital Laundry with a Fluorescent Screen, After the Electroscope had Quit on Account of Too Much Moisture: The Screen Itself Is on the Front of the Box, and the Observer Watches It through the Microscope

Radium's strange power to discharge a statically charged electroscope, even at a distance of 50 ft., makes that instrument the most important of the radium detective's tools. With it goes a small frictional electrical machine for keeping it charged. The natural sensitiveness of the instrument is increased by suspending an aluminum wire, 10 or 12 ft. long, from its knob, like a wireless antenna. The electroscope's only enemy is moisture, which practically short-circuits it and gives a false discharge signal. This is what happened at Cook County Hospital in Chicago, where a $4,100 radium tube recently disappeared. The hunters thought they had located the tiny treasure in the laundry, until further experiments demonstrated the misleading influence of the humid air.

A fluorescent screen, such as is used in X-ray work, will glow when radioactive emanations fall upon it; so a cameralike box, with a screen on one side and a microscope on the other to catch the faintest glimmer, is included in the radium sleuth's kit. The mineral willemite, consisting of crystals of zinc orthosilicate, also glows with a brilliant green fluorescence when there is radium within a few feet of it. For that reason it constitutes another of the queer tools devoted to the capture of the escaped speck of fortune.

PURIFICATION OF PARK PONDS BY DRAINING AND SUNNING

Stagnation, followed by the development of malign and malodorous forms of low plant life, is a disease common to park lagoons and ornamental ponds which suffer from lack of circulation. When four artificial lakes in the city parks of Los Angeles, Calif., became so afflicted, the park commission resorted to the method of draining them and allowing the purifying rays of the sun to shine upon the exposed beds until sanitation was complete. With the aid of the fire department, the water was pumped from the lagoons into the adjacent sewers until the outflow began to show black with the muck of the bottom. Then the discharge lines were fitted with sprays and turned upon the park lawns, for the potent fertilizing effect of the decaying sediment. A little water was left in each pond for the goldfish; but the wild fowl of the near-by coast soon discovered this inviting cache of delicacies, and the muddy pools became a splashing mass of gulls geese, ducks, pelicans, grebes, and mud hens. Much curious material was brought to light as the water receded, one lake, at Echo Park, uncovering 12 sunken rowboats, two road scrapers, an automobile, a cookstove, a human skeleton, three pistols, and a vast collection of tin cans, bottles, fishing tackle, and other miscellany. After airing and sunning the bottom for four to six weeks, the water was gradually restored, nearly a month being taken for the filling process.



Wild Fowl Flocked In to Feed on Fish as the Pond Gave Up Its Refuse

From Holes Like This in the Lake Bottom, After the Water had been Pumped Out, the Rich Black Muck was Sucked Up and Spread on the Park Lawns for Fertilizer

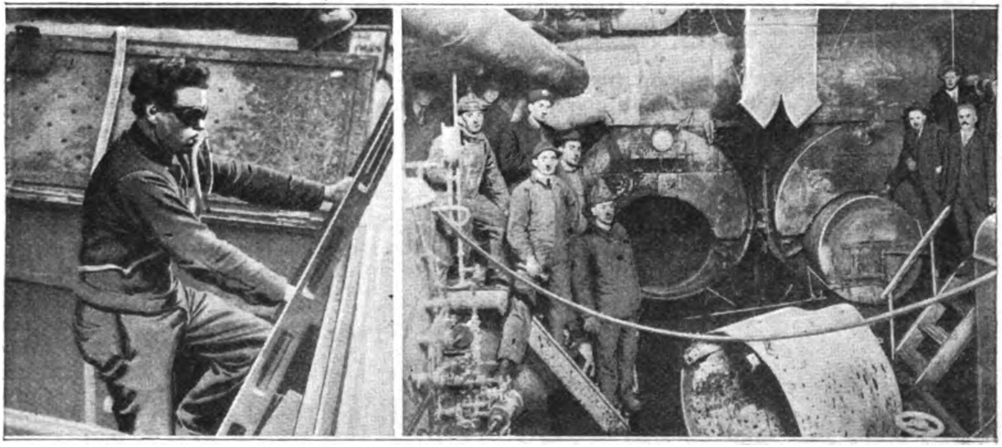
POWERFUL PORTABLE ARC LAMP FOR MOTION-PICTURE WORK

Motion pictures may be taken anywhere and at any time with the aid of a new compact arc lamp of great power, which is so light that a man can carry two of them. A twin arc is used, with two pairs of carbons cored with a compound of magnesia, giving a light closely resembling daylight. The feed is automatic, the solenoid occupying a box at the back of the lamp house. In the same box are two rheostat coils, enabling any standard electrical-supply circuit to be used. A diffusing slide of heat-resisting spun glass closes the front of the case. The lamp is supported at any desired height by a folding iron tripod. Three such lamps are sufficient to illuminate a setting 50 by 30 ft., the candlepower ranging from 8,000 to 15,000 for each.

"EX'S" KEEP ALMANACH UP TO DATE

Since 1763 the German Almanach de Gotha has given the world an annual digest of all data concerning royal families and governments throughout the world, the publishers' manuscript going to the printer in the fall, to appear in book form in the spring. But this year, unfortunately, the material prepared in October, 1918, was discovered to need alarming revision. Thus articles on Poland, Finland, and Ukrainia were canceled, "owing to the change in the course of events," while descriptions of William Hohenzollern and his friends nearly always needed a prefatory "ex." Otherwise the former emperor is allowed to retain his 53 titles without alteration.

¶Copper-oxide deposits yielding 90 per cent of copper, to say nothing of a possible gold content, have been located in the province of Värmland, Sweden.



Thick Fuel-Oil Smoke Made Masks for the Rescuers a Necessity in This Office-Building Fire. The Force of the Explosion is Demonstrated by the Fire Box in Middle of the Room at the Right, Torn Out When a Tube inside It Burst

BOILER EXPLOSION TEARS OFF FIRE BOX

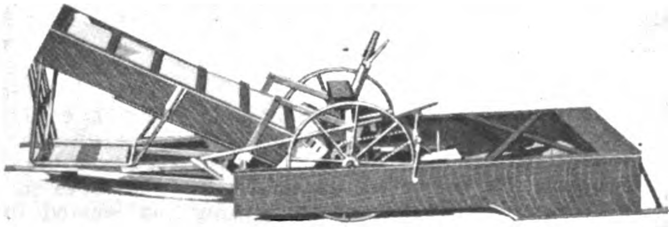
The engines kept right on running after a boiler explosion had killed three men and filled a 10-story building with steam and smoke. One feed pump, inaccessible to the firemen, continued to supply fuel oil to the flames from a broken pipe for 20 minutes. The cause of the accident may never be determined, as the men in the immediate vicinity were all killed; but it has been found that a boiler tube exploded inside the fire box, tearing it off as shown in the illustration. The fire that followed demonstrated the value of good masks to the fire fighters, as the thickness of the smoke made rescue work impossible without them.

GREAT PERSIAN OIL FIELDS ADD TO "WEALTH OF ASIA"

The famous oil wells of Baku have an oriental rival. Western Persia, between the mountains of Kurdistan and the Persian Gulf, is now known to contain oil fields whose content and value are beyond estimate. In the district of Irak-Ajemi, full of names suggesting rare and beautiful carpets, borings have yielded oil of exceptional quality, and disclosed a tract of nearly 400 square miles. A high percentage of benzine and kerosene is characteristic of the Persian oil. England has the concession to work the fields, and soon the looms of Kermanshah and Ispahan will give way to oil derricks.

JOB OF HARVESTING BEANS MADE EASY BY MACHINE

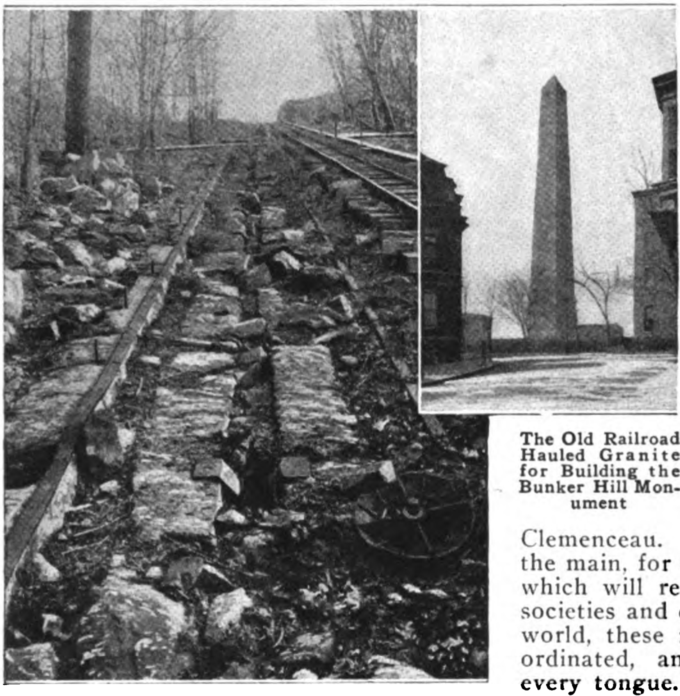
Harvest time brings peculiar worries to the bean grower, whose troubles a California inventor has undertaken to solve with a cutting machine that specializes on beans. The new harvester is drawn by horse or tractor and operated by one man. The rectangular frame at the front carries blades which cut two to four rows at once. The cut plants are then thrown by a toothed drum onto an inclined belt conveyor at the back. This in turn deposits them on a metal platform. Without stopping or leaving his seat, the operator can then dump the plants at any time.



Cutter Blades in the Rectangular Frame at the Front Cut from Two to Four Rows of Beans at One Time, the Plants Then being Conveyed Back to the Metal Platform at the Rear, from Which the Driver can Dump Them in Shocks

AMERICA'S PIONEER RAILROAD MASSACHUSETTS LANDMARK

Although America's railroad history is recorded as beginning when the Baltimore and Ohio laid its first rails in 1828, a pair of rusted strips of iron still visible in eastern Massachusetts tell of a pioneer transportation line whose inauguration antedated that event by two years. From the granite quarries of West Quincy the old road ran four miles to tidewater on the Neponset River, and carried granite for the building of the Bunker Hill monument. The rails, of hand-forged iron, 2 in. wide and ¾ in. thick, were held by hand-forged spikes to the granite roadbed. Mules were the locomotives, assisted by a cable where the grade was heavy.



Rails of Hand-Forged Steel, Laid in 1826, Still Cling to the Granite; and a Cable Ran over the Very Wheel That Lies in the Foreground

The Old Railroad Hauled Granite for Building the Bunker Hill Monument

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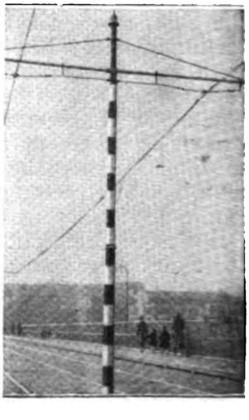
Bottled milk, ice cream, and manufactured milk products appear to be favorite substitutes for their old line of business among the breweries, especially in Pennsylvania. Other brewers are turning their properties into mineral-water plants, warehouses, laundries, garages, machine shops, packing plants, and beet-sugar factories.

RED CROSS WILL FIGHT WORLD SUFFERING

The international committee of the Red Cross feels that world peace can never be more than a political catchword until the present prevalence of disease and suffering is abated. It believes, too, that by virtue of its international organization and past experience, the Red Cross is better fitted than any other agency to carry on such a regeneration. In consequence it is announced that a conference of all Red Cross societies will convene at Geneva, Switzerland, 30 days after the signing of the peace treaty, to consider a program which, in its general features, has already been commended by President Wilson and Premier Clemenceau. This program provides, in the main, for a central bureau at Geneva, which will receive medical reports from societies and experts in all corners of the world, these reports to be analyzed, coordinated, and published broadcast in every tongue. It is pointed out that the great pandemic of influenza could have been largely checked at its start by such an organization, with its experts everywhere at work on the problem.

STRIPES ON TROLLEY POLE WARN MOTORISTS

A southern city possesses some trolley poles that are painted in conspicuous alternate bands of black and white. The city current is usually sent underground; hence poles are a rarity and it is felt that local motorists might easily collide with the pole after nightfall; the more so as it is located in the center of a viaduct which is much used as a thoroughfare.



KEEPING PEACE *for* *the* SAKE of WAR

By E. T. BRONSDON

THE virility of the human race was proven anew during the World War by the friction engendered by contact under unusual conditions. The forces of civilization were one against the foe of mankind, but several upon certain semi-humorous occasions when disagreements arose among themselves. Usually altercations started over trivial matters, like a schoolboys' scrap, and ended by responsible parties separating the contestants, before too much damage was done. This was particularly true of such colonials as the Australians and Canadians, where the blood is that of pioneers rather than savants. The opinion may be ventured that if any other than a British subject were to impugn the record of the Australians at Gallipoli, the Canadians would be the first to spring to their defense. In view of the persistent rumors—savoring too much of German propaganda—we believe Mr. Bronsdon's exposition of the following incidents particularly opportune.—Editor.

IT is not known what designing genius inspired the strife-producing arrangement. Potsdam could not have done better.

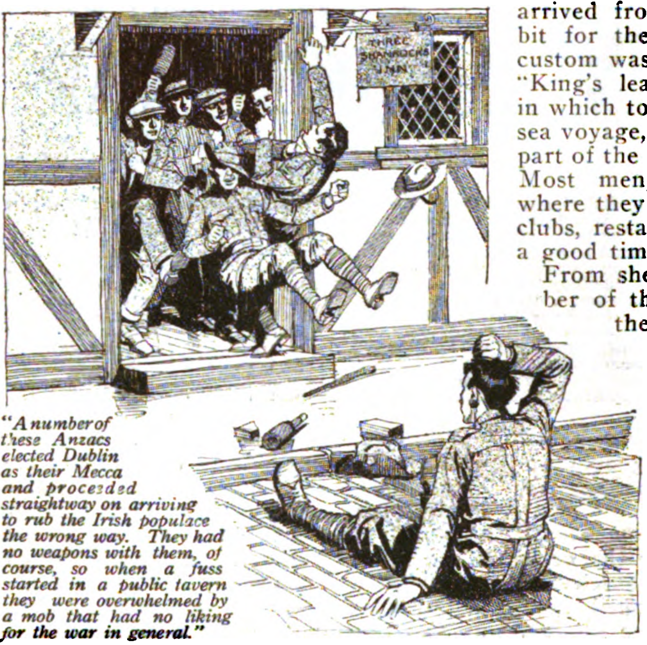
The slant-eyed Ghurkas from Nepal—silent, fierce men combining the craft of Tibet with the pride and cruelty of Himalayan natives—were jammed next to a regiment of Sikhs from the Punjab. The Germans were counterattacking on this three-mile salient, while everywhere else the sweep of the Somme offensive drove them backward.

While the ***stosstruppen*** came on in persistent waves, the two colonial regiments fought side by side like so many thousands of friendly fiends. When the counterattack exhausted itself on the knives and bayonets of the Orientals, and the soldiers had a few hours of recuperation, in the words of a British signaler detailed to the sector, "'ell popped, immejit!"

"Technically the dispute began over the possession of a goat, brought up to be slaughtered for a certain squad of ***Sikhs. Whatever the real cause, in ten minutes the whole sector was a scramble of personal combats to the death, and a whole Devonshire division was called upon to separate the supposed allies."***

The Ghurkas spied the blue-clad Sikhs—in dress, as in matters of food and religion, the latter troops insisted on maintaining their native custom—and knew them for the enemies they had feared and hated for centuries before the British occupation. Technically the dispute began over the possession of a goat, brought up to be slaughtered for a certain squad of Sikhs. Whatever the real cause, in ten minutes the whole sector was a scramble of personal combats to the death, and a whole Devonshire division was called upon to separate the supposed allies. When at last the Indians were pried from each other's throats, over a hundred casualties had occurred. The Sikhs were removed from the vicinity immediately, and later taken to Mesopotamia, where they gave gallant service against a foe with whom they could grapple to their hearts' content.

Had the Huns known the details of this internecine battle, they might well have penetrated the sector to a damaging extent. Providentially, they thought they had exhausted the possibilities in that direction, and kept their distance. It was suggested later in a trench paper that the "Huns were too bally sensible to risk their hides in that kind of a rumpus."



"A number of these Anzacs elected Dublin as their Mecca and proceeded straightway on arriving to rub the Irish populace the wrong way. They had no weapons with them, of course, so when a fuss started in a public tavern they were overwhelmed by a mob that had no liking for the war in general."

While this incident was one of the most striking of some regrettable happenings that occurred among the British colonials during the course of the war, there were others for which even less excuse can be found. T. P. O'Connor, the Irish orator, struck at the heart of the matter in a speech before the Hibernian Club last year. "It is deplorable in a way, and glorious in a way—but true anyway—that every contingent of His Majesty's troops believe themselves by far the finest men, the best fighters and the most indispensable soldiers on the face of the earth," he said. "The Scots will tell you to a man that the Hielan' r-r-regiments cannot be sur-r-rpassed, sor! The Canadians will wager anything on their Princess Pats, while the Irish . . . . ." And "Tay Pay" betrayed the fact that he considered the boys from the Emerald Isle to be the decisive factor in every war, no matter where it was fought, or by whom.

Considering the matter in the cold light of retrospect, undimmed by the need of prudence or the smoked glass of censorship, it perhaps was fortunate for Britain that her various nephews "hated the Hun worse than they loved each other."

When the first 30,000 Anzac troops arrived from the antipodes to do their bit for the empire and civilization, the custom was to give every colonial instant "King's leave." This meant eight days in which to stretch his legs after the long sea voyage, and free transportation to any part of the British Isles he desired to visit. Most men, of course, chose London, where they were given the run of all the clubs, restaurants, and theaters, and had a good time generally.

From sheer perversity, though, a number of these Anzacs elected Dublin as their Mecca, and proceeded straightway on arriving to rub the Irish populace the wrong way. They had no weapons with them, of course, so when a fuss started in a public tavern they were overwhelmed by a mob that had no liking for the war in general, and who had decided to hate Anzacs in particular. Battered, with some of them unconscious from wounds, the amazed visitors were given the last indignity. They were thrown into a civil prison!

Of course, this could not last. Under heavy guard they were led out and shipped back to England. Immediately, on hearing the details of the story, every last man in the Anzac expeditionary force put in an application for leave—the tacit reason being "overseas service in Ireland!" The authorities were too wise to permit this, naturally, and from that time on no Australian or New Zealand fighters were allowed to go to Ireland. Even at the time of the Sinn Fein rebellion an Anzac detachment quartered at Bramshott Camp was slighted deliberately, though its commander, Brigadier General Carey, expressed his willingness to help out in the emergency. Had they gone over, it is likely that Sinn Fein and Ireland would have become synonymous in a day.

Shortly before the second battle of Ypres, three battalions of Scotch kilties and a brigade of Welsh fusileers were in billets at Steenvoorde and in the immediate vicinity. As always happened, when troop units of these nationalities got together, there was a football game. Every soldier who could possibly squirm out of fatigue duty attended. The game finished with the Welshmen victors, three goals to two.

The Scotch took their disappointment with fair grace, taking into account that huge sums of money—considering the rate of a soldier's pay—changed hands. A chance for revenge was seen, however, by a coterie of the Highlanders. Each platoon possessed at least one game cock, and the Welsh were inveigled into matching their birds the following evening. The back room of an *estaminet* was transformed into a pit, and the feathered warriors met. As was imagined, a great majority of the Scotch fowl proved the hardier, and the lost pay was regained. In the arguments that arose following the cockfights, however, a number of the soldiers lost their tempers. One of the bloodiest free-for-all fist fights ever waged ensued, in which every member of both contingents present engaged. Noses were bashed, jaws knocked askew, and not a few of the combatants were badly injured, before a detail of military police broke up the affair. It was mainly on account of the bad blood thus engendered that neither Scotch nor Welsh were given an opportunity in the great battle which came a few days later. Both had been sent to points in the line widely separated.

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This incident, while not of the kind which makes for harmony in the forces of a nation fighting for its life, possessed the redeeming feature of not causing any fatalities. The soldiers used no weapons other than those nature provides, while in many of the other brushes, particularly between colonials, knives, revolvers, bayonets, and even machine guns played a part.

One of the worst of these occurred early in the war, between the Canadians and Anzacs. Intense rivalry always had existed, and this manifested itself in strange ways at times, and in none more bitterly than the following.

The second Australian division had participated in the fiasco at Gallipoli. It had hurt their pride terribly not to accomplish their objective, so when the time came that they were withdrawn and placed on the western front, each man was as sore in spirit as an ulcerated tooth is in the flesh.

Imagine the feelings of the portion that first went to the front-line trenches beside the Canadians to find awaiting them the rude figure of a horseman, mounted on a whitewashed wooden steed with its forelegs upraised.

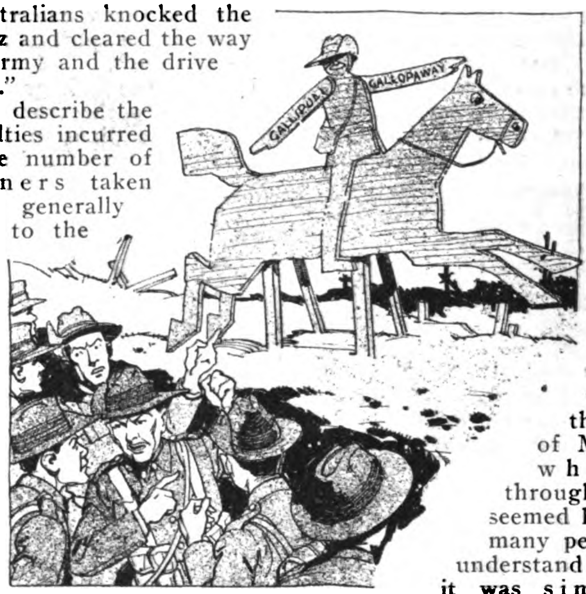
A hand with pointing finger perched above the horse's tail bore the terse legend "Gallipoli." Another hand, with finger indicating the course the horseman evidently was pursuing at breakneck speed, was labeled "Gallop-away!"

An altercation, with much bitter repartee, arose, but a fire was lit that smoldered for days, finally to break out in a terrible small-scale trench battle in which machine guns were turned upon each of the parties of combatants by the other. Had the authorities not interfered immediately, a fair-sized war between Canada and Australia would have been fought out right then and there, without any sort of a declaration by either country.

A "sandwich filling" of French troops was summoned immediately and placed between the two branches of colonials, who ever after were kept apart as far as possible. Though reason and common sense came to rule fairly well before the armistice was signed, there never was a time when Anzacs and Canadians were not ready to jump each other.

The next to last manifestation of this spirit came when during the festivities in London following the signing of the armistice Maj. Gen. Charles Rosenthal, commander of the Anzac forces, made a speech to an assembly of his men. He reviewed their achievements, dwelling particularly on the work at Amiens, where "the Australians knocked the spirit out of Fritz and cleared the way for the British army and the drive of August eighth."

He went on to describe the number of casualties incurred (211,349) and the number of German prisoners taken (142,608), and generally gave full praise to the men under him. This would have been all right had not some one conceived the notion of printing this speech and pasting it up on the Canadian barracks at Morraught, and elsewhere. Overnight an amendment appeared, in the form of a printed slip pasted below. In lurid language, this slip told how the Anzacs were assuming credit belonging elsewhere, and stated baldly that the Anzacs had waited until Fritz was "jolly well licked before getting into it much, if any."



"Imagine the feelings of the portion that first went to the front-line trenches beside the Canadians to find the rude figure of a horseman . . . — a hand with pointing finger bore the legend 'Gallipoli.' . . . Another hand indicating the course the horseman was pursuing was labeled 'Gallopaway'."

As a result all the slips with the amendments were torn down, and the colonial troops were sent to separate embarkation points.

As a finale to the whole trouble, the plan of shipping Anzac soldiers home through Canada was broached. This did not get far, as the Canadian government refused instantly to allow any such thing. The Anzacs could go through the Panama Canal, through Suez, through the Straits of Magellan, or anywhere, but not through Canada. This seemed like discourtesy to many people who did not understand the situation, but it was simple precaution. Nothing worse than continuous discomfort for the travelers probably would have occurred, but in the light of events that had transpired, it was considered best to take no unnecessary chances.

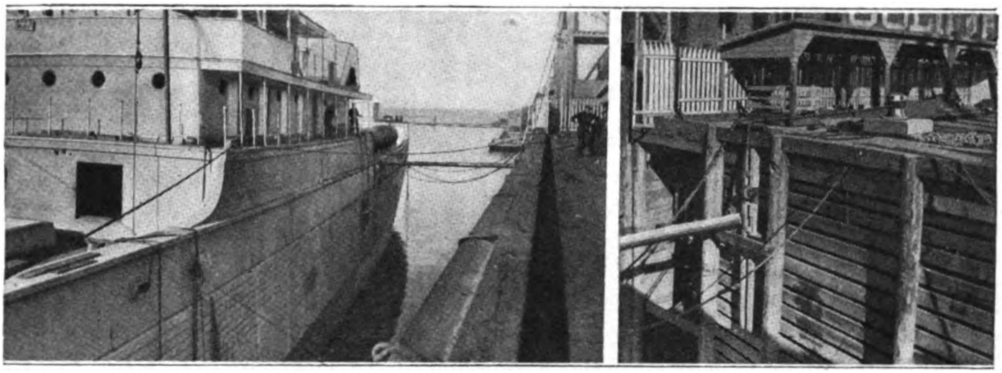
BANK WINDOW FRAMES GARDEN EXHIBIT

CAN VEGETABLES AND FRUITS
BANCA DI RISPARMIO
SOTTO IL CONTROLLO DELLO STATO
SI PAGA L'INTERESSE SUI DEPOSITI

This is Not a Grocery Store Display but the Exhibit of a Patriotic Bank to Boost Food Production and Conservation. Its Location in Paterson, New Jersey, Which Has a Large Italian Population, Explains the Foreign Inscription Below. This Means "Savings Bank. Interest Paid on Deposits"

Pumpkins and preserves are vying with mortgages and bonds in the interest of this thriving bank which realizes the importance of abundant food production and conservation. In patriotic response to the national war-garden campaign, the show window is now utilized for a permanent display of prize products of backyard garden and kitchen. Despite its foreign name the bank pictured is a prosperous, all-American institution, located in an eastern city.

¶Thick beds of graphite in northern Siberia are reputed to be nearly equal in quality to those of Ceylon and less expensive in operation.



The Ship in the Left View is being Pushed Away from the Dock by a Breasting Pole Moved Out from Under the Dock by a Capstan. The Right Picture Shows the Pole Emerging, with the Cable That Pulls It Running over Rollers and Back to the Capstan on the Dock. The Side Ropes Prevent Swerving as the Pole Comes Out

SLIDING POLE SET IN DOCK SAVES SHIPS FROM FIRE

To the growing list of devices for saving property from possible destruction has been added an ingenious and extremely simple arrangement for moving ships away from a burning dock. A stout pole, 40 ft. long, is set on rollers under the dock and, of course, at right angles to it. A cable from a capstan on the dock runs over pulleys on the edge, back into the hole in the dock and is attached to the butt end of the pole. When the capstan is operated, either by hand or steam, the cable pulls the pole out of its hole against the side of a ship lying at the dock. Guiding cables fastened to the outer end of the pole prevent side sway. Two poles, at stem and stern, are sufficient for ships of ordinary size, and will move a ship safely away from the dock in 20 seconds.

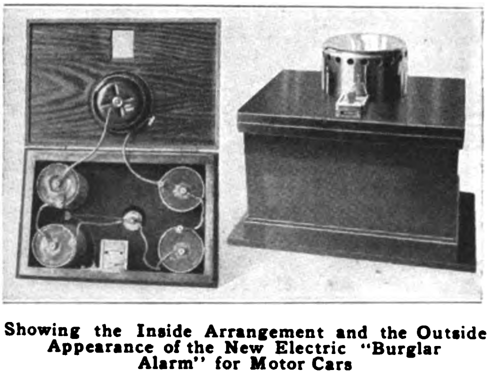
AWNING SCREENS MOVEMENTS OF DERRICK

A contractor on a large structural job recently observed that his carpenters at their benches invariably took "time out" to watch the swaying loads carried over their heads by a large derrick. He recognized an irresistible human impulse here, but decided he could defeat it. He ordered a flimsy canvas awning constructed over the workmen on the ground, and now reports a 10-per-cent saving in working time.

¶The Labor Department has announced its intention of extending the U. S. Employment Service to our insular possessions.

ELECTRIC ANTITHEFT DEVICE FOR MOTOR VEHICLES

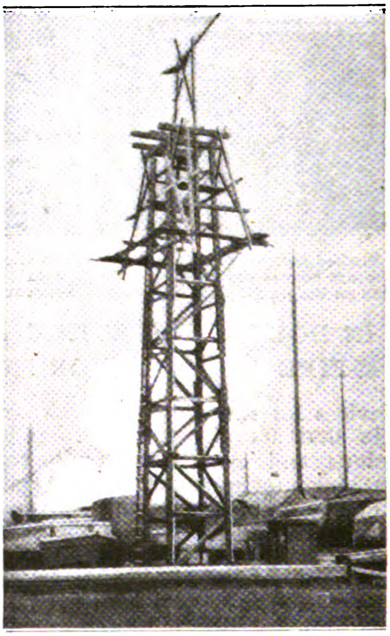
To check automobile thieving is the purpose of an electric accessory lately devised for the motor car and demonstrated before police authorities of an Ohio city. Essentially the contrivance consists of an automobile siren connected in a dry-battery circuit with a mercury switch. The latter comprises a vibrating arm, of about knitting-needle thickness, on which is mounted a covered metallic cup that holds mercury. Passing through the lid of the cup is an insulated contact member which, when in normal position, is within a sixteenth of an inch of the quicksilver. When the car is in motion, vibrations agitate the mercury so that the gap is bridged and contact formed, sounding the horn in the event the circuit is closed. Thus if anyone, without the owner's knowledge, attempted to steal a car so equipped, the siren would sound immediately and keep on doing so until the engine was stopped or the electric circuit opened.



Showing the Inside Arrangement and the Outside Appearance of the New Electric "Burglar Alarm" for Motor Cars

CONCRETE TELEGRAPH POLES MADE IN UPRIGHT MOLD

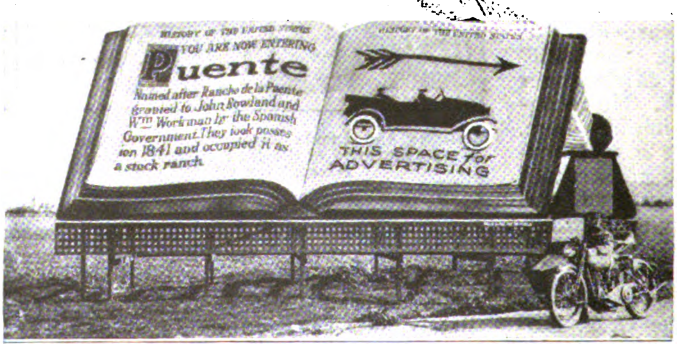
Vertical molds are used at a plant in West Haven, Conn., for casting concrete telegraph poles. Four of the molds are supported by a towerlike frame of timber. Chains. hung from the top of the tower. are used for reinforcing the upper half of the poles, the lower half being strengthened by a hollow steel core held upright in the center of the mold. The mixture is hoisted to the top of the tower and poured into the molds, which are removed early enough to dress the poles to a smooth surface before they set.



Four Molds for Concrete Telegraph Poles are Supported Vertically by This Timber Tower. The Poles, Reinforced by Steel Cores and Chains, Hung from the Top, are Cast by Hoisting the Mixture up the Tower

EDUCATIVE BILLBOARDS INTEREST MOTORISTS

The automobile tourist is soon to find travel a more enjoyable and profitable experience as a result of an advertising device inaugurated by a large manufacturing company. Billboards displaying bits of local historical interest will be placed on the outskirts of many communities. awakening an educative interest in community life and tradition which should be profitable to both tourists and residents.


HISTORY OF THE UNITED STATES
YOU ARE NOW ENTERING
Puente
Named after Rancho de la Puente granted to John Rowland and Wm Workman by the Spanish Government. They took possession 1841 and occupied it as a stock ranch.
HISTORY OF THE UNITED STATES
THIS SPACE for ADVERTISING

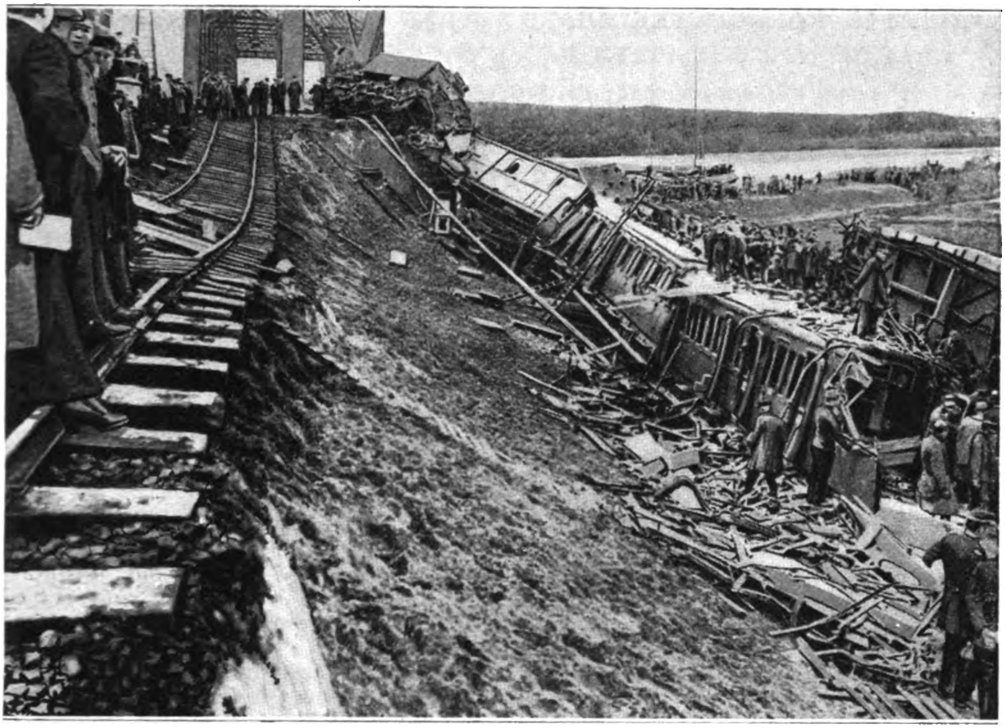
These Bits of History Are Sure to Awaken Us to the Interest and Appeal of Our Own Land

ARMY HAS LARGEST ENGLISH UNIVERSITY

The new American Army University which offers a three months' course at Beaune, 175 miles southeast of Paris, is perhaps the most outstanding element in the extensive educational work carried on by the American Expeditionary Forces in France. Housed in what was formerly an Ameri hospital are 15,000 dier-students an force of 500 teac The curriculum is table for its ag tural college with acre farm, its eng ing department, uses the old h workshops, and studies in art and tecture, which ar esting almost 1,0

"PERSHING TO CONN TOWNS KN TO WARRIOR

A project to immortalize the communities intimately identified with the personal history of Gen. John J. Pershing has been launched with the temporary organization of a "Pershing Highway" association at Lincoln, Neb. A road, 3,000 miles long, running from New York City to San Francisco, is the proposal. Its course would be through Philadelphia; Trenton, N. J.; Baltimore; Washington, D. C.; Columbus, Ohio; Indianapolis; Springfield, Ill.; Laclede, Mo., Pershing's birthplace; St. Joseph, Mo.; Lincoln, Neb.; Cheyenne, Wyo.; Salt Lake City; Carson City, Nev., and Sacramento. Governors of the states through which the proposed highway would pass have already been invited to help form a permanent organization for the development of the plan.



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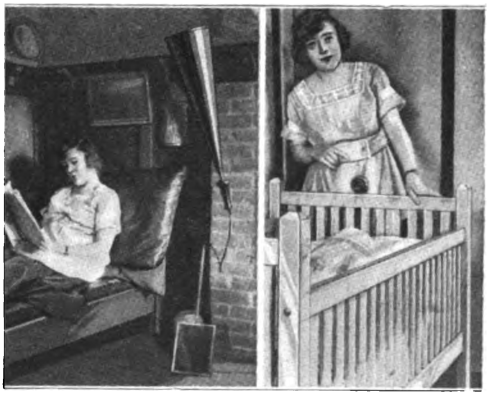
Heavy Rains Caused the Collapse of This Dike, near Amsterdam, Holland. It will be Noted That the Right-Hand Track of the Railroad, as Well as the Passenger Train on It, was Swept to the Bottom of the Embankment. Workers are Seen Searching for Killed and Wounded Passengers

WHEN HOLLAND DIKE CRUMBLES WHOLE TRAIN IS WRECKED

For most people the dikes of Holland have held a romantic suggestion of peril ever since mother read them the story of the boy who stopped the leak with his arm. A short time ago a dike near Amsterdam was undermined, not by the seepage of the sea, but by heavy rains. The disintegration of the earthen embankment destroyed a railroad line along the top and completely wrecked a loaded passenger train, killing at least 50 and injuring 100 travelers. The cars were rolled to the bottom of the bank in a tangled mass.

DICTAPHONE CALLS MOTHER WHEN BABY CRIES

A dictaphone with a megaphone, and a loud-speaking amplifier in the receiver, is the gift of an ingenious husband to his wife. With the receiver fastened to the baby's crib in the nursery upstairs, and the megaphone placed in the parlor below, the arrangement works to everyone's satisfaction. Mother may go about her housework, while baby will sleep soundly, undisturbed by the noise of the living rooms. Should he waken, however, his demands will be heard instantly through the house.



COPYRIGHT, JOHN EDWIN HOGG

The Dictaphone will Warn This Mother When Her Baby Cries. The Receiver is Placed at the Head of the Crib

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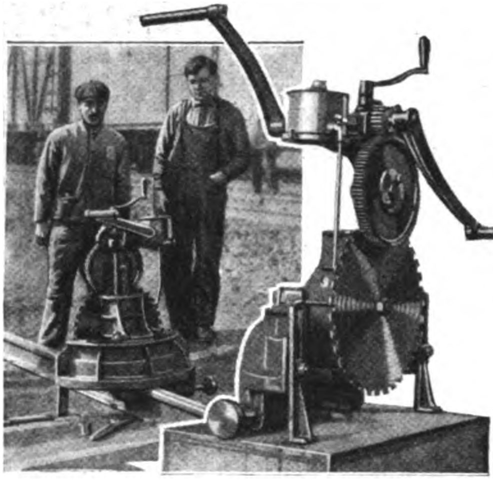
ℭAn Atlantic seaport for Switzerland, Bohemia, and other inland nationalities, is the aim of a new movement in France, intended to free them from economic bondage to Germany.

PORTABLE RAIL-CUTTER GEARS DRIVE SAW BY ITS TEETH

An odd feature of a portable hand-driven saw for cutting railroad rails, developed at St. Louis, Mo., is that its circular saw is driven by a steel sprocket engaging the periphery of the blade. Positive feed and a very small saw arbor, giving greater clearance, are the advantages of this arrangement. The sprocket is adjustable for wear. The saw is 18 in. in diameter and 3/16 in. thick, and makes a smooth vertical cut to a depth of 7¾ in. at any desired angle to the rail. Cranks, reducing gears, and saw are mounted on a slide, which feeds automatically at the proper speed for cutting standard rails; but hand-feed may be substituted by releasing a nut on the feed screw. The machine weighs 350 lb., and is moved along the rail, when not clamped to it, by throwing into position a roller at the rear. An electrically driven model with saw-grinding attachment, weighing 450 lb., has also been developed along similar lines.



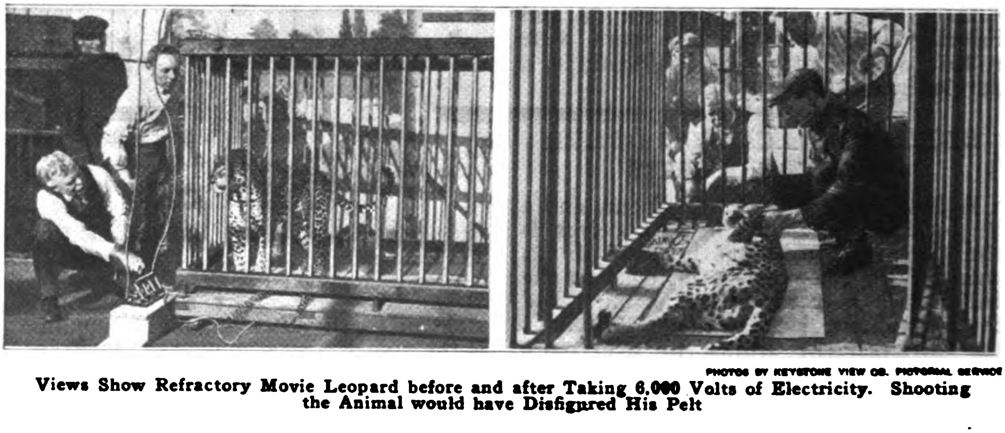
Portable Hand-Driven Cutter for Railroad Rails: Its Saw is Driven by Gears Meshing with the Teeth. Seen at the Left, Clamped to the Rail Ready for Work

TUNNEL THROUGH PYRENEES RECENTLY PIERCED

The rigors of mountain weather, opposition from the national ministries of war, and a difference in gauge have all united in the past to prevent an effective joining of French and Spanish railways. Work on the project has been carried on since 1904, however, and it is now announced that a new tunnel from Ax, in France, to Puigcerda, on the Spanish side, has been broken through, and will cement this desirable union more firmly.

ELECTROCUTE HUGE LEOPARD TO SAVE PELT

The only requirement imposed on a movie leopard is that he look pleasant about his work. But one of these beautiful beasts recently took to sulking—a failing which made him decidedly unpopular with actors in jungle scenes. The manager of the company at last decided that he must die, rather than continue as a menace to those acting with him. Shooting "David" with a high-powered rifle was first considered, but was objected to, as it would disfigure the valuable pelt. To avoid this, electrocution was decided upon, using power from a near-by station. A steel plate was secured to the floor of the cage and connected with the 6,000-volt line. The leopard was placed on the plate, and the other wire fastened to his leg. A turn of the switch, and "David" passed to his reward.



PHOTOS BY KEYSTONE VIEW CO. PICTORIAL SERVICE

Views Show Refractory Movie Leopard before and after Taking 6,000 Volts of Electricity. Shooting the Animal would have Disfigured His Pelt

WHERE MATERIAL SCIENCE GIVES AID TO SPIRITUAL PROGRESS

Signs Like This Are Now a Familiar Application of Electric Lighting, Adding Secular Conspicuousness to Ecclesiastical Dignity

Oldest, Most Popular, and Perhaps Most Impressive of All Illuminated Church Signs is the Blazing Cross, Symbol of Hope Shining in the Dark

Modest Signs of Few Lights Cast Their Rays Not So Far but Just as Earnestly. This One is to Be Found in New York City's Italian Quarter

EVER since priestcraft passed into disfavor, leaving unsolved mysteries of applied mechanics, the church has considered its few uses of the technical arts with extreme circumspection. The necessary conservatism of the cloth has made it especially sensitive to the orthodox dread of theatrical effect, under which classification flashing signs and tricks of mechanism seemed so readily to fit. It is only with the growing realization of the dignity of publicity, the virtue of illumination, and the nobility of those natural laws on which depend all science and all mechanics, that divine service finally has accepted the coöperation of technology.

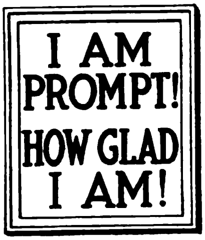
The world beats no path to any door that is inconspicuous. The house of worship, serenely aloof from the banalities of commerce, but forced by the frailties of wavering human eyes and minds to compete with other appeals, finds help in the blaze of electric lights and the magic of ingenious signs. In the city of New York more than 150 churches send the calm influence of their beacon rays into the dark and doubtful corners and byways. Many an untold tale of redemption is said to hang upon the blazing cross of St. Anthony's spire—the pioneer of illuminated sacred finger posts, dating back to gas-jet days in the 70's. Those chapels too modest (a common fault) to aspire to the 400-candlepower cross find humble assistance in little four-lamp reflectors that throw their feeble but earnest rays on a simple lettered sign.

But electrical display is not the end of the modern alliance between religion and science, nor does the latter's coöperation stop outside the sacred edifice. More than one zealous pastor has applied the tremendous magnetism of the motion picture to the problem of keeping the flock contented in the fold. On one occasion a crew of camera men, under the temporal guidance of an enterprising minister, took views on windy Fifth Avenue corners to illustrate a sermon on the immodesty of the prevailing fashions. For once, at least, there was no question about attendance!

Especially engaging just now, is the inspiration of a Los Angeles pastor, from the steps of whose prosperous church on a recent Sunday morning a bugler—one of the congregation's service stars returned from overseas—blew the "Call to Colors." Many of the young army men who gathered to the notes accepted the clergyman's invitation to enter; and he forthwith determined that the bugle call to worship should continue as a Sabbath feature.

Parishioners of a Kansas City church who had acquired a tardy habit, not unusual on the day of rest, were brought effectually to time by a reversible sign, ingeniously turned around by clockwork at the moment services began. Early arrivals were greeted by the comforting legend, "I Am Prompt! How Glad I Am!" while the tardy ones were reproached with, "I Am Late! I Am Sorry. Next Time I will See the Other Side of This Sign."

A church in an Arkansas town takes up its collection with one of those cash carriers used in department stores. From the pulpit the minister shoots it down the


I AM
PROMPT!
HOW GLAD
I AM!

track above the aisle, and on the way it is stopped at every pew by means of a series of lugs on the track. When the end-seat occupant feels that his particular pew has done its contributory duty, he pushes the collector along.

Entirely different in conception and more curious, perhaps, was the enterprise of a Kansas clergyman, formerly a telegraph operator, who arranged during the war for a wire connection from the railway station to his pulpit. When the clicking sounder told him a troop train was coming, he promptly dismissed services, and everybody went down to see the boys go through. The trains never stopped, so he obtained some hoops like those used for delivering train orders on the run, and with them the congregation passed candy and cigarettes through the car windows to the soldiers.

Returning to our first interest, the electric sign, most peculiar of all is the one on a church in a Kansas community, which attends particularly to the spiritual needs of railroad men. In semblance of a fiery block semaphore, this impressive signal sets the "stop" against those who would thoughtlessly hurry on down the road to perdition, and its red lantern, warning of danger, bids them enter the gospel station and get the right of way before they start on the next division of life's schedule.

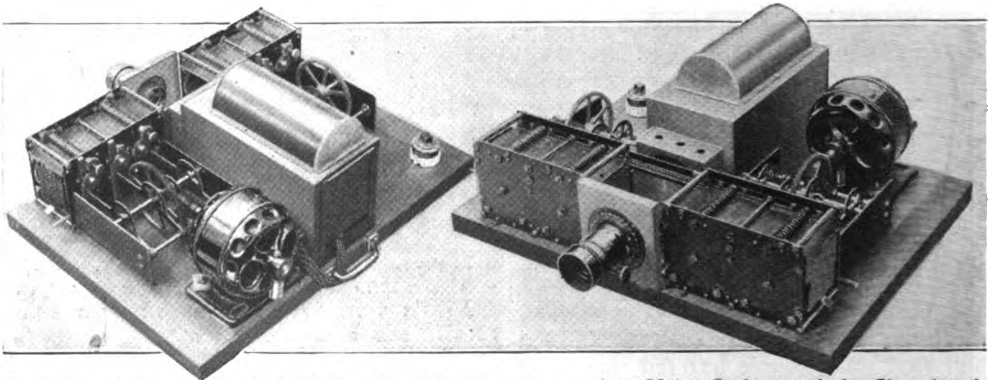
SCULPTOR EMPLOYS CAMERA TO VERIFY WORK

A sculptor with originality uses the camera to verify the exactness of his work. It is believed that defects and resemblances can be checked in this way much more carefully than by reference to the subject.

By Consulting This Picture Sculptor can Make Easy Comparisons between Original and Copy

AUTOMATIC SLIDE PROJECTOR CHANGES ITS OWN VIEWS

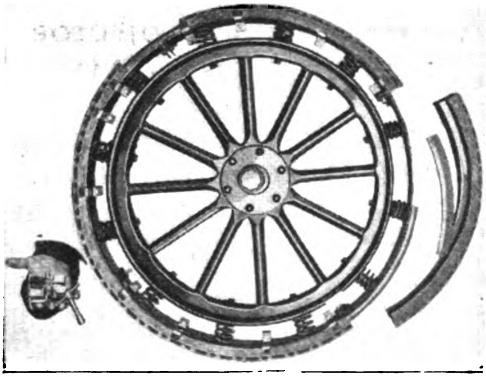
Pictures projected on a screen have a value for advertising, educational, and entertainment purposes limited only by the fact that an attendant must constantly be present to operate the projector. To obviate this objection, a stereopticon has been devised whose operation is wholly automatic. The standard-size machine has a capacity of 46 slides, and projects them one after another. The picture is changed every 12 seconds, and the machine starts over again when it reaches the end of its series. A small electric motor operates the mechanism, and a 1,000-cp. incandescent lamp furnishes ample illumination for a large, clear picture. The dimensions of the complete machine, 26 by 19 by 7 in., permit carrying



The Little Electric Motor at the Rear of This Portable Stereopticon Makes It Automatic by Changing the Slides Every 12 Seconds. It Holds a Series of 46 Slides in the Magazine at the Front it in a case of suitcase size. Special models for lecture work are made holding up to 200 slides, with a push button for controlling the screen time of the pictures.

PUNCTURELESS AUTO TIRE APPLIED IN SECTIONS

That punctures continue to be the bane of the autoist's existence is demonstrated by frequent ingenious efforts to make them impossible. Now a Denver inventor is displaying a wheel with a false rim in four quadrantal sections, with three spiral springs between each section and the felly. To this rim are fastened similar sections of semicircular rubber tire tread, with shorter rubber sections as a filler, taking the place of the usual inner tube. The clamps that hold the tire on are quickly removed or replaced with a socket wrench. The ordinary tool box will hold spare sections.


COPYRIGHT, INTERNATIONAL FILM SERVICE

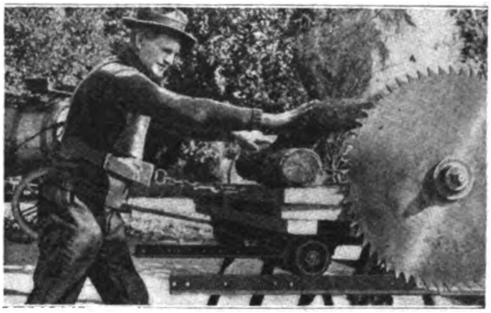
Sections of This Punctureless Auto Tire may be Removed in a Few Moments with a Socket Wrench. Spiral Springs Make the Wheel Resilient

CAR FERRY MAY CROSS ADRIATIC SEA

War-time experience with car-ferrying across the English Channel has demonstrated the practicality of a proposed railway line from Rome direct to Constantinople. Instead of the present northern route through Udine, the projected line will run its trains south from Rome to Brindisi or Otranto; thence by ferry across the Adriatic, about 45 miles wide at this point, resuming the land journey at Avlona, Albania. Such a development would hasten the reëstablishment of stricken Serbia, and shorten the distance from Rome to Constantinople 640 miles.

CHAIN LINKS OPERATOR TO BED OF POWER SAW

Increased efficiency is claimed by the designer of an original wood-sawing accessory. To the sliding bed which carries the logs against the revolving blade he attaches a chain which hooks to a strap about his body. Consequently, when the log has been cut, the sliding bed is returned to its starting position by the natural act of stepping backward, leaving both hands free to handle the log. This is considered less clumsy and much safer than the usual method, which requires one hand for the bed and one for the log.


COPYRIGHT JOHN EDWIN HOGG

The Body Harness and Link Fastening Enable Worker to Return Sliding Bed by Stepping Backward

SEA GULLS FATTEN IN WAKE OF TRACTOR PLOWS

A recent strike among sea fishermen along the Pacific coast has developed a remarkable and unexpected result. Flocks of sea gulls, accustomed to easy pickings on refuse from fishing vessels, have been driven inland, where they now patiently follow tractor plows which bring appetizing grubworms to the surface. Spectators will testify that the gulls are growing fat on their new diet.

Sea Gulls Fattening in Wake of Tractor Plow by Snatching Up Exposed Grubworms

IMITATION CONCRETE SHIP CANADIAN PARADE FLOAT

An ingenious Canadian parade float is reported from Sydney, Nova Scotia. It was built to represent a reinforced-concrete motor ship which is actually under construction at that port—the first of its kind in Canada. The float was made of spruce slats covered with wallboard and mounted on a motor truck, and, with flags and pennants flying in the breeze, made a striking appearance in the Victory Loan parade. It was decorated with electric lights for night driving. Two men from the shipyard assembled the float in three hours.

Float Imitating a Concrete Ship, Used in a Canadian Victory Loan Parade: It was Made of Wallboard on a Spruce Frame, Mounted on a Motor Truck, and Fitted with Electric Lights for Night Work

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ℭA canal from Antwerp on the North Sea, to Marseilles, on the Mediterranean, is a new European reconstruction project. The proposed route goes clear around by way of the Rhine, across to the Saône and thence down the Rhone, and would float 6,000-ton ships.

AIR FIGHT IS STAGED FOR MOVIES

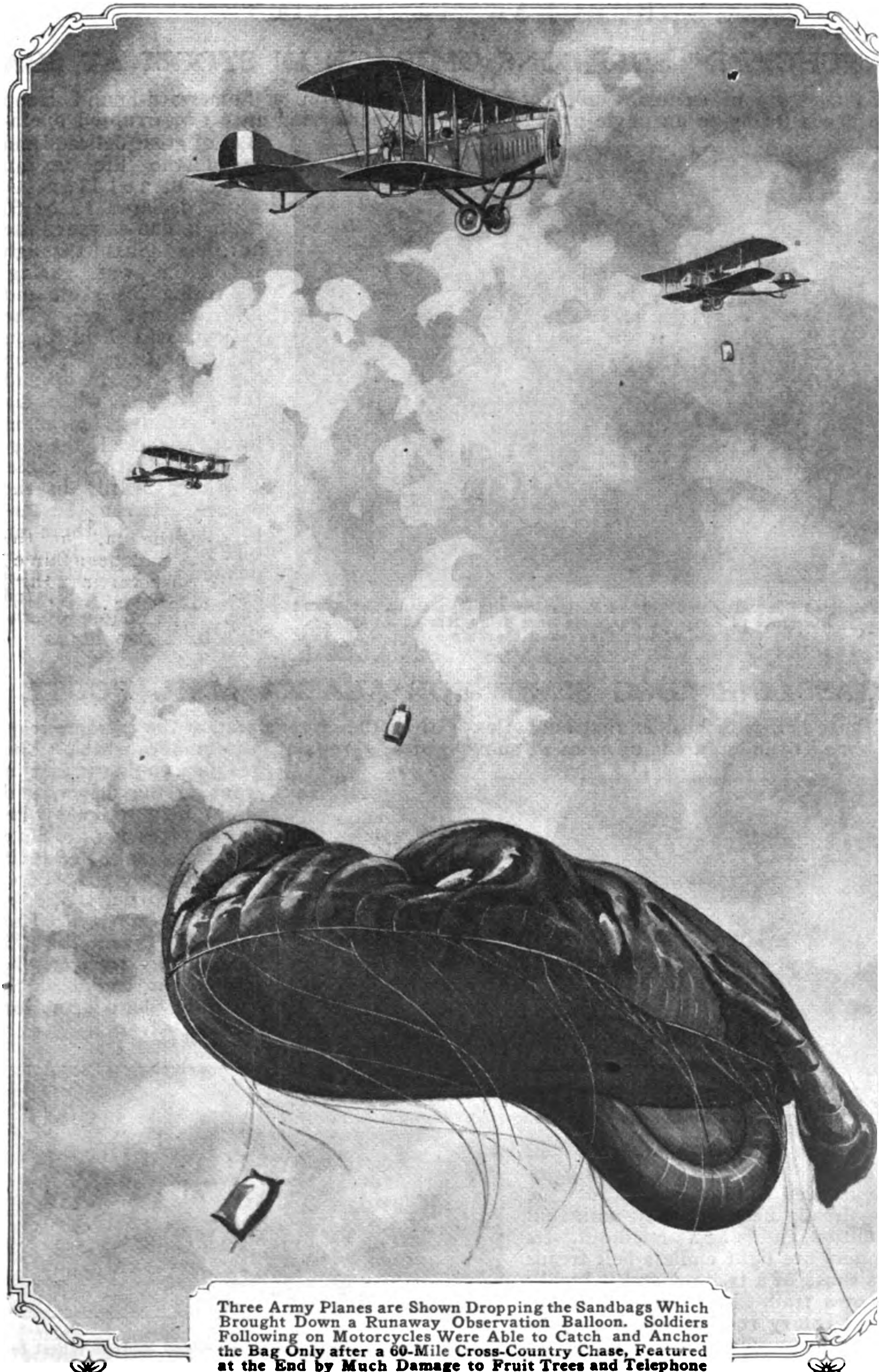
A fast German two-seater and an American "Spad" were recently seen in violent combat above an American aerodrome in France. Watchers below saw a figure fall from the Hun machine, strike the ground, and burst, scattering straw in all directions. The body was soon followed by both fighting planes — which landed very nicely, however. The pilots, both Americans, were congratulated on the realism of their mock combat. Every maneuver in the "engagement," culminating in the fall of the dummy, had been filmed by an observer in a third machine which had hovered as near the combatants as safety permitted.

WOMAN DOCTOR OF GARDENS TREATS FLORAL AILMENTS

City folk who have undertaken a back-to-the-land movement with more zeal than knowledge, and presently find their gardens going into a mysterious decline, may now secure the services of a regular garden doctor. That is the profession adopted by a woman graduate of a horticultural school near Philadelphia. One of her methods is to give the land owner a course of lessons in beautifying his property. These instructions do not overlook the problem of making gardens profitable as well as delightful.

AIRMEN STOP RUNAWAY BALLOON WITH SANDBAGS

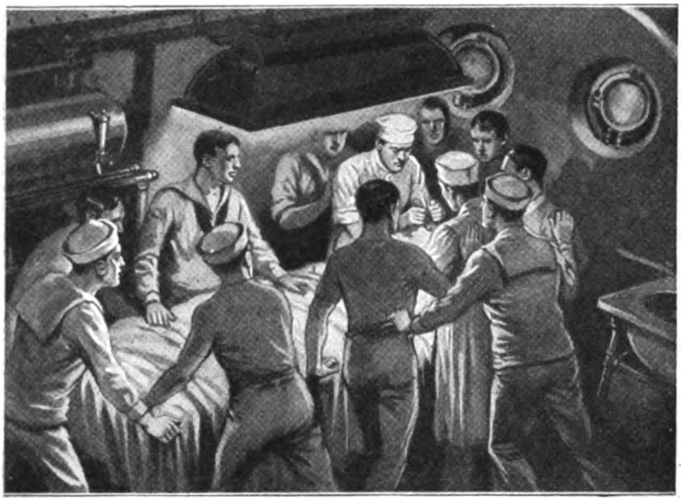
After a thrilling and spectacular chase of more than 60 miles, an army observation balloon, which broke away from its moorings in a squall, was brought down near Riverside, Calif., recently by the weight of sandbags hurled upon it from above by three airmen. An unexpected windstorm ripped the fins off the great bag, and the balloon then became entangled with five others that were aloft on the field at the time, and in the efforts of the ground personnel to haul all the "sausages" down, the bag snapped its cable and sailed away. Three fliers in as many planes immediately went aloft and gave chase. A hot pursuit followed before sandbags dropped by the airmen ripped the bag, weighted it down, and decreased its buoyancy, until it was driven to earth. In grounding, the balloon uprooted a number of fruit trees and damaged electric and telephone wires before being anchored down by a corps of motorcycle soldiers who had given chase on the ground. Unfortunately the accident cost the life of a cadet, who fell from the balloon from a height of 3,000 ft., when the storm struck it.



Three Army Planes are Shown Dropping the Sandbags Which Brought Down a Runaway Observation Balloon. Soldiers Following on Motorcycles Were Able to Catch and Anchor the Bag Only after a 60-Mile Cross-Country Chase, Featured at the End by Much Damage to Fruit Trees and Telephone Wires

"ANCHORED" SURGEONS OPERATE IN STORM AT SEA

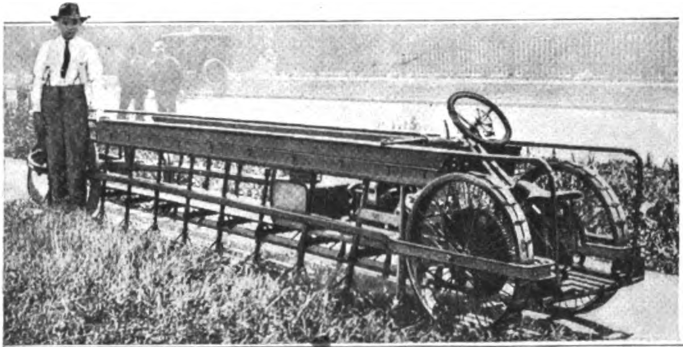
In a storm of extreme violence, with the decks tilting to an angle of 38°, two surgeons on a homeward-bound troop ship performed an oft-interrupted operation of great delicacy and saved the life of an American soldier. A wave, declared to be 50 ft. high, had smashed the porthole glass through which he was gazing, fracturing his skull and injuring one eye. The patient was held upon the operating table by the ship's chaplain and three sailors, while six more sailors by main force "anchored" the surgeons against the table. Working mainly in the pauses between the terrific plunges of the ship, they successfully trepanned the soldier's skull and dressed his injured eye. The whole operation took two hours.



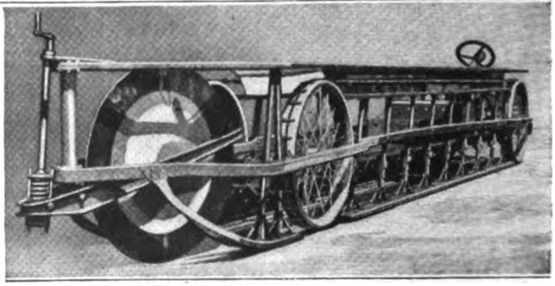
It Required Four Men to Hold the Patient on the Operating Table, and Six More to Keep the Surgeons from being Hurled Away by the Violent Plunges of the Ship

GASOLINE "DOG SLED" FOR ALASKA MAIL ROUTE

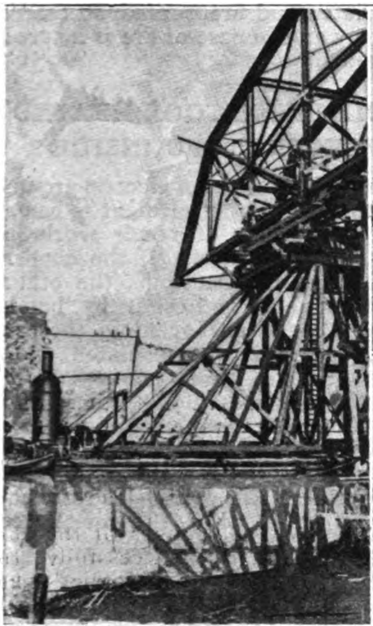
Those half-wolf huskies that haul Alaska's mail over hundreds of miles of snow and ice will have to look to their time tables and mind the whip, or the gas sled will get their jobs. One has already been designed with that intention, and is being tried out. Its runners are light endless-belt treads like those of a tractor, and it breaks its own trail. In front is a sharp-edged rotary rudder, which may be adjusted as conditions require, to cut deeply or lightly into the frozen surface, and the steering is done from the driver's seat, at the extreme rear, with a regular automobile wheel. The gasoline engine is just in front of the driver, and might help to keep him from freezing. The huskyless dog sledge is 25 ft. long, weighs 890 lb., and has carried 1,500 lb. 100 miles a day. The dogs are averaging 25 miles a day with 650-lb. loads over trails which must be broken for them in advance.



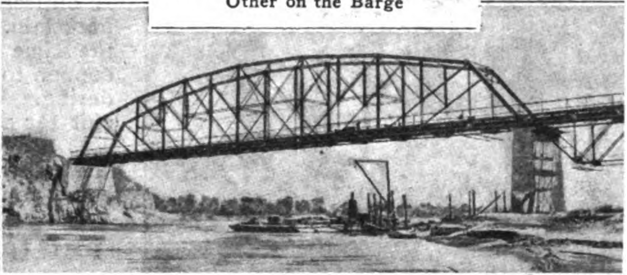
Power Plant, Driver's Seat, and Steering Wheel Are at the Rear of the Gasoline "Dog Sled," Whose Endless Tread Breaks Its Own Trail



Viewed from the Front, the Sharp-Edged Rudder Wheel Is Visible, as Well as the Screw Adjustment for Raising and Lowering It to Cut Deeply or Lightly into the Frozen Surface According to the Condition of the Trail



The Span being Towed into Place with One End Sliding on the East-End Track, and the Other on the Barge



Left: The West End of the Span, Supported by Scaffold of Piling on Floating Barge. Right: The Span in Place, having been Hauled into Position by Cables in Three Hours and 40 Minutes

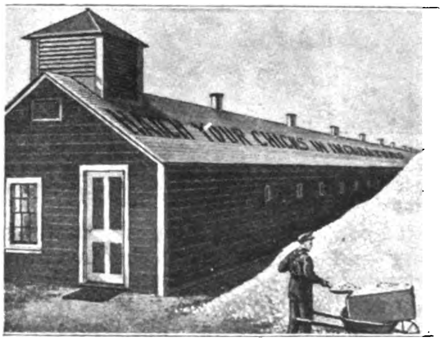
BIG BRIDGE SPAN FERRIED ACROSS SWIFT RIVER

Twice the swirling current of the Colorado River defeated the engineers who were trying to install a big steel highway bridge at Yuma, Ariz. It sucked out of the river bed, first, 75-ft. and then 90-ft. piling intended for the temporary support of the long center span of the bridge. Then the exasperated chief engineer secured a big wooden barge, and built upon it a scaffold of piling as it lay at anchor under the end of the span, to which the floating structure was then made fast. Most of the huge steel fabric now lay well back on the east-shore span, while on the west shore the concrete abutment was made ready. Then slowly, almost inch by inch, stout cables towed the barge across the river, its burden increasing as the long span slid gradually along its shore support. It was 2:40 p. m. then; at 6:20 the west end of the span slipped accurately into the abutment sockets, and the watching population of Yuma drew a long breath.

¶To overcome the effect of moisture on optical instruments it is suggested that lenses be boiled in distilled water before being put in place, and that the instruments be made air-tight, if possible, and filled with dry air.

EGGSHELLS HAULED BY WAGONLOAD

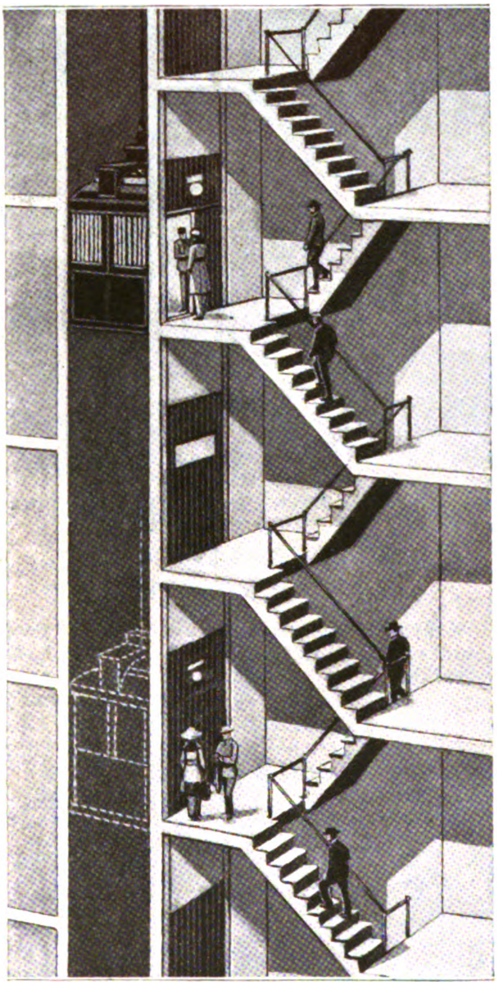
America possesses some of the largest chicken hatcheries in the world, a single establishment sometimes having a capacity of 225,000 eggs. One room in such a hatchery has 33,000 eggs in process of incubation at one time. An interesting by-product of the industry are the shells which accumulate in mountainous piles. They are not wasted, however, but are ground and sold to chicken raisers for feed, principally as a bone builder, thus completing the cycle to everyone's satisfaction.



This Man is Shoveling the Eggshells Which Form a Valuable By-Product of Mammoth Chicken Hatcheries

FAST ELEVATOR SERVICE FOR HIGH BUILDINGS

A novel arrangement of stairways and elevators for high office buildings has two possible advantages. Realizing that the greatest loss of carrying time is caused by stopping and starting cars, the inventor has provided that passengers enter elevator only at alternate stair landings, not at floors themselves. Thus all floors are served equally, and elevator speed is so increased that many more passengers may be carried per day, a particularly desirable feature for very tall structures where congestion is usually the rule during rush hours. And by combining stairways and elevators in this fashion, the entire shaft may be isolated and fireproofed, so that a safe and easy exit in case of fire is insured to the tenants.



In This Elevator System Each Car Serves Two Floors, Promoting Rapid Operation and Thus Increased Passenger Capacity. The Stairway and Elevator Shaft Form a Fireproof Unit

ODD SOLDERING TOOL HEATED BY ELECTRIC ARC INSIDE

A soldering iron with an electric arc inside of it for the heating element is being used for some kinds of repair work in Europe. The rear surface of the copper head forms one arc electrode, the other being a carbon rod adjusted by hand. Except for a small gas opening, the arc is entirely inclosed and insulated with porcelain. It takes three minutes from the time the arc is struck to heat the copper to the right temperature for soldering. With a small resistance in circuit for steadying the arc, the implement uses 625 watts at 125 volts. The arc itself operates at 40 volts, the remainder being consumed in the resistance.

PHILIPPINE LIME AND QUARTZ ENCOURAGE GLASS INDUSTRY

Consumption of common glassware in the Philippine Islands has increased so rapidly of late years that there is a movement in Manila to establish local glassworks. Good limestone of coralline and crystalline composition is available in all parts of the islands, especially extensive deposits occurring near Manila. Veins of solid quartz are plentiful in Mindoro, while great beaches of quartz sand offer an inexhaustible supply. The Philippine Bureau of Science has produced some excellent experimental glassware, which has successfully met all tests.

FRENCH AIRMEN INSTRUCT JAPANESE AIR SERVICE

The reorganization of Japan's air service is being supervised by a delegation of veteran French fliers, who are in this way fulfilling a promise, made by their government during the war, to render such assistance on cessation of hostilities. For equipment, the mission has brought 100 French planes and the personnel comprises 20 men and 17 officers, each officer wearing several decorations for merit and bravery.

¶The New Zealand postal service proposes an aerial route from Auckland, over the Wellington Strait, to Dunedin, 700 miles to the south.

THE EYE BEHIND THE LINES

How Battles were Lost and Won According to Superiority of Contending Forces in Aerial Photography

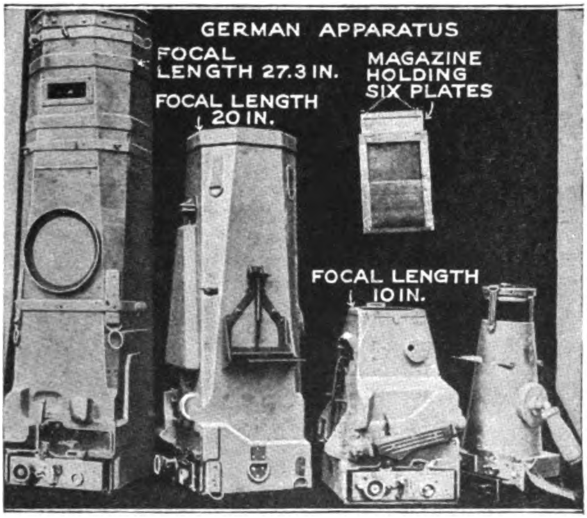
By DOUGLASS REID

Part III.—How the Camera Conquered Camouflage

THE trenches! The air is shaking, reeling, tearing; the ground is heaving, flying, collapsing. Fire, mud, metal sear and splatter everything. Orders are shrieked, and the commander disappears in a shell clap, while the men who carry them out topple carelessly to the ground. Great cannon flash noiselessly, so lost are their voices in the deafening roar of other guns. Brown squads of men leap over a ditch top and vanish in the smoke. Wires break, airplanes come crashing to earth; wires break and telephone men throw up their hands; wires break and a stream of enemies come lunging through a gap in the barbed strands. Bones break, bayonets break — hearts break.

All is confusion. "Where is the Eighty-Ninth? Where are the Fusileers? Where are the Zouaves? Is Hindenburg through on the left? Did Colonel De Rescke win Marmont farm?"

Chaos has come!

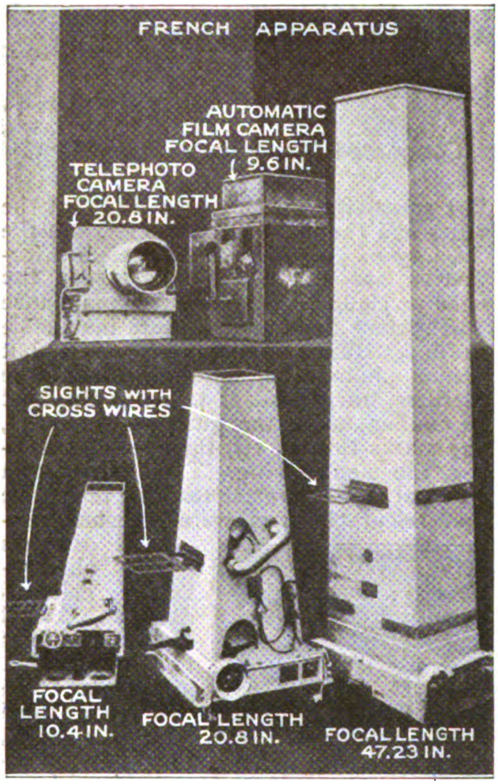


German Cameras Salvaged from Fallen Planes and Used against Their Former Owners: Optically and Mechanically Not Inferior to Allied Apparatus, Except in Focal Length and Magazine Capacity, They Had One Advantage in Their Four Interchangeable Shutters with Different Apertures

Through such scenes the spies of the air, the camera men, sped on their daily tasks during the great war. In the hit-trip-smother of that most infernal of all human agonies, trench warfare, the camera detectives of both allied and German forces worked with desperate speed, yet with cool, scheming, studious brains, for on them the infantry commanders relied for precious information. The side whose air photographers were best won the war.

That the last great German drive failed last summer was due to the fact that the allies had the mastery of the air, and the mastery of the air meant complete information, through the camera, as to the enemy's plans. Long-range reconnaissance and battery photography were invaluable in forestalling coming offensives, but trench photography meant actual battle pictures, hurried snaps taken in the heat of conflict, when the guards were down, the masks thrown off, the shells screeching, the men coming. Then the camera was put to its severest test, for telephone and telegraph lines were smashed, dispatch riders shot, observation balloons burned, all other sources of information crippled. The side that owned the air then, had an incalculable advantage, for every 15 minutes a plane would come winging back to its photo-section headquarters to drop a series of photographs showing the progress of the battle.

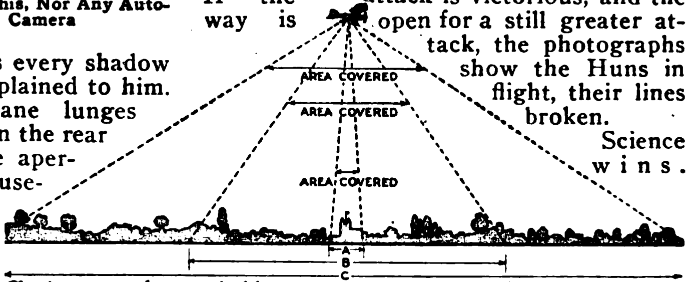
For instance: The "Yanks" are to attack before Sedan at 5:45 in the morning. The photograph men in their dugout clear away all nonessential pans and fluids, the developer is ready, the printing frames and lights tested, the cameras adjusted, the airplanes poised. The attack begins. The field becomes Bedlam! An enemy barrage falls, the American barrage creeps ahead of the charging "doughboys." At the head of each platoon marches a lieutenant in khaki, in his left hand a photograph of the objective, in his right a revolver. The photograph is more important, for it has been obtained by the camera men weeks ago, and its every shadow and high light carefully explained to him.



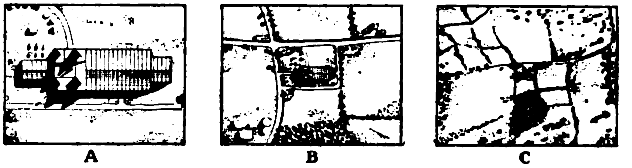
Of These French Cameras, the Big One, at the Right, Records a Man's Trail across "No Man's Land" from a Height of Four Miles—Comparatively Safe Flying. The Germans Had Nothing Like This, Nor Any Automatic Map-Making Film Camera

At 5:50, the first airplane lunges forth and the camera man in the rear seat, glancing through the aperture in the bottom of the fuselage, begins to shoot pictures rapidly. At 6:05 the second airplane follows. At 6:20 the third goes out. As it roars up, the first airplane comes shooting back, having photographed the progress of the doughboys, their enemies, and the effect of both allied and German artillery fire. This first plane does not land; it circles over the photographic headquarters, and the camera man, leaning out, lets his plates fall on the end of a parachute. Then the plane wheels and darts back into the spitting, rocking air above the field. Six-thirty-five, and a fourth plane goes up as the second plane returns to drop its plates. Within the photographic dugout the plates are developed frenziedly; prints are made, and snatched wet from the frames. The "printer" dips the first picture in alcohol, touches it to a tiny gas flame and, as it burns, whips it suddenly downward, putting out the blaze, and tosses it dry to the photographic officer, who numbers and labels it, and in turn throws it to the motorcycle rider, who "crack-cracks" away to the general. The picture is in headquarters 20 to 30 minutes after the photographer took it over the battle field. The prints now flow in a steady stream into headquarters, the photographic division is moving like clockwork. The attack is successful and headquarters moves ahead. The photographers swarm out of the dugout, leap into a motor lorry, with their instruments, bottles, and cameras in their arms, and bounce forward to a new depot.

All the time the scout and observation planes are watching the battle and reporting to headquarters direct, but their word is at best confused and often conflicting. The main reliance is upon the photographs, for they do not lie. If the Yankee barrage is cutting its own men to pieces, the camera shows it; if the attack is defeated, the camera shows the men huddled in shell holes, or lying dead on the ground. If the attack is victorious, and the way is open for a still greater attack, the photographs show the Huns in flight, their lines broken. Science wins.



Showing areas photographed by different-focus lenses on 5x4" plate at same altitude.
A. Telescopic lens
B. Ordinary lens (8" to 12" focus)
C. Short-focus or wide-angle lens


A B C

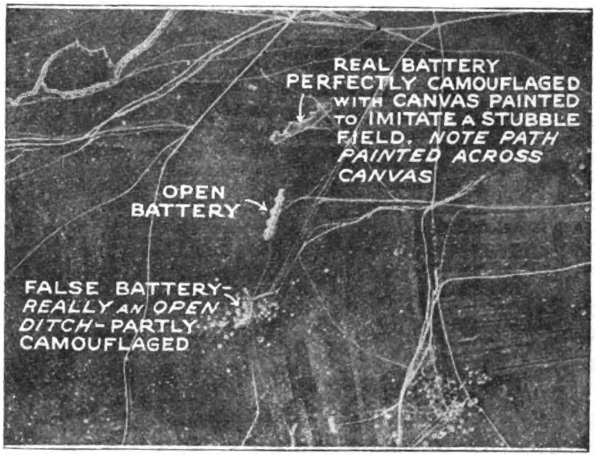
In Taking Pictures of Hostile Territory the Scout Usually First Covered a Large Area with a Short-Focus Lens. Any Suspicious-Looking Parts were Then Photographed with an Ordinary Lens, Revealing More Details, and, Suspicions Confirmed, the Main Object would be Clearly Brought Out by the Telephoto Camera, as Indicated Here

The photographic planes drop out of the skies like blackbirds at the discharge of the farm boy's shotgun, but others take their places and the work goes steadily on.

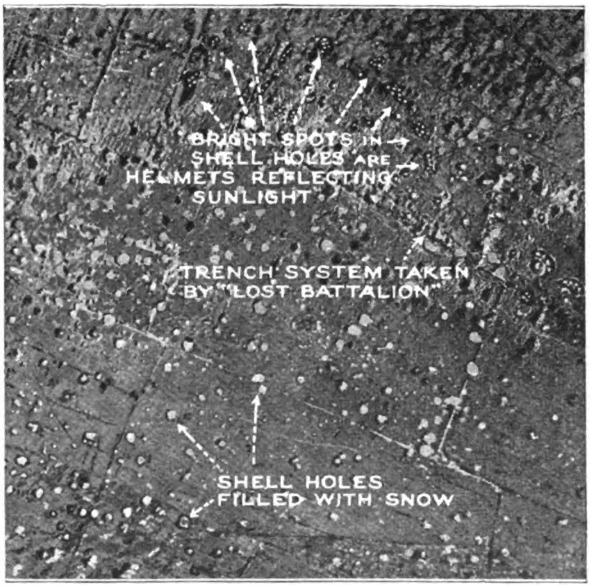
The whole system of attack in trench warfare was based on photographs. The pictures located the enemy's centers of resistance in the puzzling network of trenches—an all-important thing, for the German system was, in case of attack, to desert certain sections of the trenches and fall back into strongly fortified centers, to let the attackers count themselves victorious and, swarming on past, be caught in cross fires from these centers and annihilated. In the early days of the war, the "Princess Pat's," Canada's pride, were tricked so, permitted to penetrate past these isolated centers of resistance, and then killed to a man by bullets in the back.

In the later days of the war, the allies, holding control of the air, photographed the Hun lines in detail, spotted these centers of resistance and singled them out for bitter shelling, with the result that when the attack was made, the infantrymen, discarding the lightly held sectors of German trenches, concentrated on the centers, took them, and routed the Germans.

The famous Hindenburg line, which allied infantrymen agreed could never be taken, was taken because the allied photographers, by deduction and detective work, spotted the centers; because they discovered and worked out the strength of German forces carefully hidden in dugouts; because they revealed the position of trench mortars, machine guns, tank traps, camouflaged trenches, batteries, ammunition dumps, and the thousand and one other things that marked the activities of the enemy.


REAL BATTERY PERFECTLY CAMOUFLAGED WITH CANVAS PAINTED TO IMITATE A STUBBLE FIELD. NOTE PATH PAINTED ACROSS CANVAS
OPEN BATTERY
FALSE BATTERY-REALLY AN OPEN DITCH-PARTLY CAMOUFLAGED

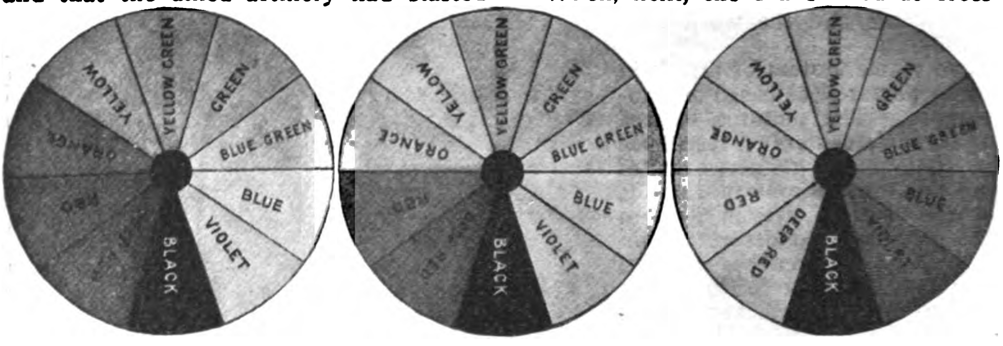
Having Wasted a Fourth of a Ton of Shells on a Partly Camouflaged False Battery and Silenced an Open One, the Allies were Still Exposed to a Galling Fire from This Point. The Camera Showed Nothing But a Stubble Field, with Uninterrupted Paths Crossing It, but the Filter Lens—the Unerring Analyst of All Camouflage — Discovered the Secret of the Canvas-Covered Battery


BRIGHT SPOTS IN SHELL HOLES ARE HELMETS REFLECTING SUNLIGHT
TRENCH SYSTEM TAKEN BY "LOST BATTALION"
SHELL HOLES FILLED WITH SNOW

In an Unsuccessful Attack a British Battalion was "Lost" after the Retreat of Its Regiment. To Locate and Relieve It Was Imperative. A Camera Scout was Sent Out. Snow had Fallen and Filled the Shell Holes, but in Some the Camera Recorded Reflections of the Bright Morning Sun. These Were Helmets: The "Lost Battalion" was Found, and a Quick Sortie Rescued It

An amazingly detailed chart and "plot" of the entire Hindenburg system was made — a painstakingly mapped revelation of his defense works.

How many lives the camera saved will never be known. When it came, the awful toll taken by errors in judging the condition of barbed wire ceased. In the early days, commanders had to rely on observers for reports as to the condition of these barriers. Mistakes were common, for the eye of an aerial observer is at best faulty. He might report that the barbed wire in "No Man's Land" looked thoroughly shattered, and that the allied artillery had blasted the German trenches as well. Headquarters, on his report, would order the men over the top, only to meet an unruined zone of wire, to be held up by it, and shot to pieces by German machine guns that had weathered the allied fire. When the camera came, headquarters learned to wait until the photographs showed the wire unmistakably gone, when every shell hole in "No Man's Land" overlapped another.



From Right to Left, the Disks Represent the Various Colors as Photographed by an Ordinary Lens upon a Common Plate, with a Panchromatic or Red-Sensitive Plate, and by the Use of a Specially Prepared Color Filter. Upon the Different Effects, as Here Shown, is Based the Color Analysis Which Penetrated the Perfect Nature Imitation in Camouflage the Huns Believed They had Accomplished

At the crack of dawn, before an attack, allied cameras photographed the objective, and if any Huns were left after the bombardment and had come up to meet the assault, the prints caught them.

In this way the camera made cavalry obsolete, for it surpassed this picturesque branch in all of its former-day achievements. What cavalry was maintained in the great war was a more or less sentimental concession to the glowing memory of the gallant and hard riders of the type of Murat, Phil Sheridan, and "Jeb" Stuart.

If a surprise attack was to be made, the camera gave the infantry a detailed map of the vulnerable points, showing where the large dugouts, sheltering from 18 to 20 men each, were located, and where the small dugouts, housing nine to a dozen men, were. It showed them just where the Germans had placed sandbags to cut off a captured trench, and where the machine guns were which could enfilade the captors.

When Von Hindenburg, frightened by the success of the tanks at Cambrai, widened his trenches in order to trap the iron monsters, the camera detected the move, and when the tanks came again each had a special snout on its end that increased its length sufficiently to let it cross handily.

When, next, the Huns fixed at crossroads carefully camouflaged "pits," which would break down under the weight of the tanks and precipitate them into captivity, the camera, through its special lenses for the detection of camouflage, caught the trick and gave warning to the tank drivers. When, again, Hindenburg placed automatic antitank guns at roadsides, with electric batteries to set them off when the passing monster sprang the switch, the camera ferreted out the hidden cannon and again the tanks were saved.

This matter of detecting camouflage was most vital in trench warfare, and, mechanically, the solving of the question is the camera's biggest feat.

The Germans were uncannily adept at camouflage—no more so than the allies eventually, but at first they were a step or so ahead. They used color shrewdly.

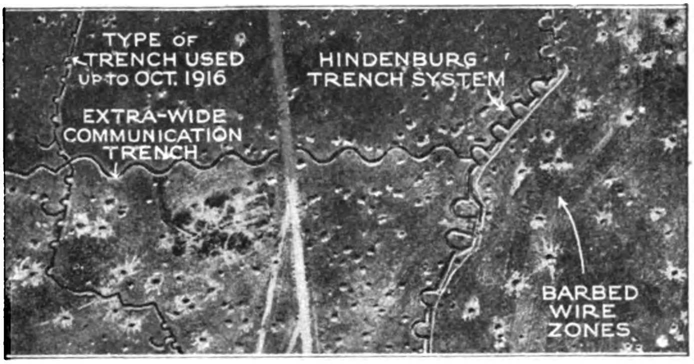
Now it is a very prevalent idea that all creatures see about the same thing when they look upon the earth. But science proves that different animals see different things; that man sees differently in other ways, and that the camera is more truthful than any eye.

The grocer's horse will stop with unerring precision before the usual door in a row of houses which are so exactly alike that the driver has always to consult the number. On the other hand, the horse will know his master when the man masquerades in a false mustache, while the master's dog will go crazy with fear. And yet, if the master dons woman's clothes, the dog will not be troubled, but the horse will have grave suspicions.

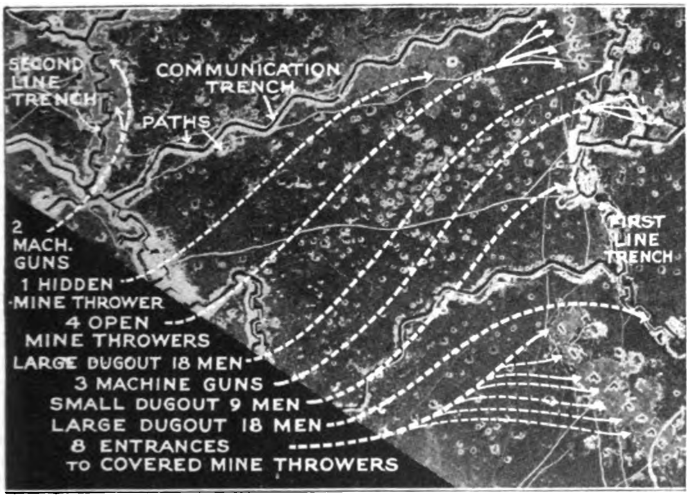
The camera, in detecting the masquerading tricks of the Germans in the war, was as unerring always as the man was at times, the dog was at other times, or the horse at still others. The camera that the allies perfected saw colors that man does not see at all. The camera shows the golden, fluffy hair of a girl almost black, and the blue-black hair of an Indian gray. The camera catches the band of ultraviolet in the rainbow that is invisible to the human eye. If an ultraviolet monster were to appear we could not see it, but the camera would photograph it.

The ordinary camera sees blue best, but science worked out a panchromatic plate which, while still being most sensitive to blue, sees other colors so well that it defeated German camouflage.

For instance, a stereoscopic picture shows a suspicious depression close behind the German trenches. Has it a battery hidden in it? The whole field is smooth and green, having looked so innocent that it was not shelled. In reality it contains a battery covered with green canvas. The green paint blends perfectly with the green grass. However, it wouldn't fool a cow, and it doesn't fool the camera when a special, green-filter lens is used, for the plate shows the green grass in its pure color, while it shows the painted canvas impure and distinct. The green paint is a mixture of yellow and blue, and it photographs vastly different from pure green. Immediately the artillerymen are shown the trick, and they drop shells on it, while the allied truck drivers roll merrily along some road within their own lines that the Hun battery was planning to shell.


TYPE OF TRENCH USED UP TO OCT. 1916
HINDENBURG TRENCH SYSTEM
EXTRA-WIDE COMMUNICATION TRENCH
BARBED WIRE ZONES

The "Unbreakable" Hindenburg Line Is Here Shown in Contrast with the Earlier Trench Form. Lined with Concrete and with Dugouts 20 to 30 Feet Underground, It Was Practically Shellproof. Yet It was Broken, and the Tanks Did Their Part. Not the First Ones, However, for They could Not Cross the Extra-Wide Communication Trenches. Then They were Equipped with a Beak or Skid, in Front, and Gaps, Barbed Wire, "Pill Boxes," Nor Machine-Gun Nests could Stop These Modern Juggernauts



Their Equal in Bravery and Equipment, the Hun Lacked the Shrewdness of Deduction Possessed by His Allied Adversaries. To the Latter This Photograph Revealed Not Only All the Facts Lettered into the Picture but Also That the Position Was a Junction Point of One Bavarian and One Prussian Battalion, All Matters of Prime Importance in Preparing an Attack

Any color used in camouflage can be detected by color-filter lenses, which resolve the component hues into separate parts. Nor is the witch vision of the camera limited to defeating camouflage. Suppose you were a photographer flying over the Hun trenches on a day when the blue haze dimmed everything. An ordinary lens is helpless, but you put on a yellow lens, and this, holding back the blue rays, takes a sharp, clear view of your objective. In the heavy atmosphere of northern France, the prevalence of this blue haze at low altitudes made this yellow filter a most important adjunct to the camera, and many an attack was carried out or withheld through information given by its fog-piercing power.

A dummy of a dead horse placed in "No Man's Land" fooled the allied observers, but the color filter showed that it was a painted iron replica housing a sniper. Yellow curtains, spread in a stubble field over crouching men, became a distinct, open subterfuge to another filter. Concrete emplacements for machine guns, "pill boxes" as they were called, were painted the color of the earth, and yet the many-hued lenses sooner or later showed them for what they were.

Once Germans hollowed out a mountain, fitting it for luxurious quarters for 1,200 men—electric lights, billiard tables, bathrooms, music rooms—putting a small rock-colored canvas over the little entrance. A French photographer, Collier by name, attached to the "Blue Devils" at the time, found this camouflage speck by his color filters, suspected something, told the artillery, and the latter bombarded the tiny mark. Finally one shell made a direct hit, plunged on down into the interior and, exploding, fired some stored ammunition and killed every one of the 1,200 Huns within. The ruined mountain is named "Collier's Hill" today.

The trail of the human foot is, in trench photography, even more important to the clue-hunting camera man than in long-range and battery work, for the trenches are the honeycomb of walking men. The allies learned to catch the thread of narrow-gauge railways near the front by the telltale whitening of the ground between the tracks, made by men pulling the ammunition-laden cars, after the locomotives had been taken off when the trench zones were reached.

When the allied infantry had gone over the top, the cameras would often lose the men because smoke would screen the field. They had only to wait, however, until the smoke cleared, to photograph the scene, and, picking up the footprints of the soldiers, trace them to their objective.

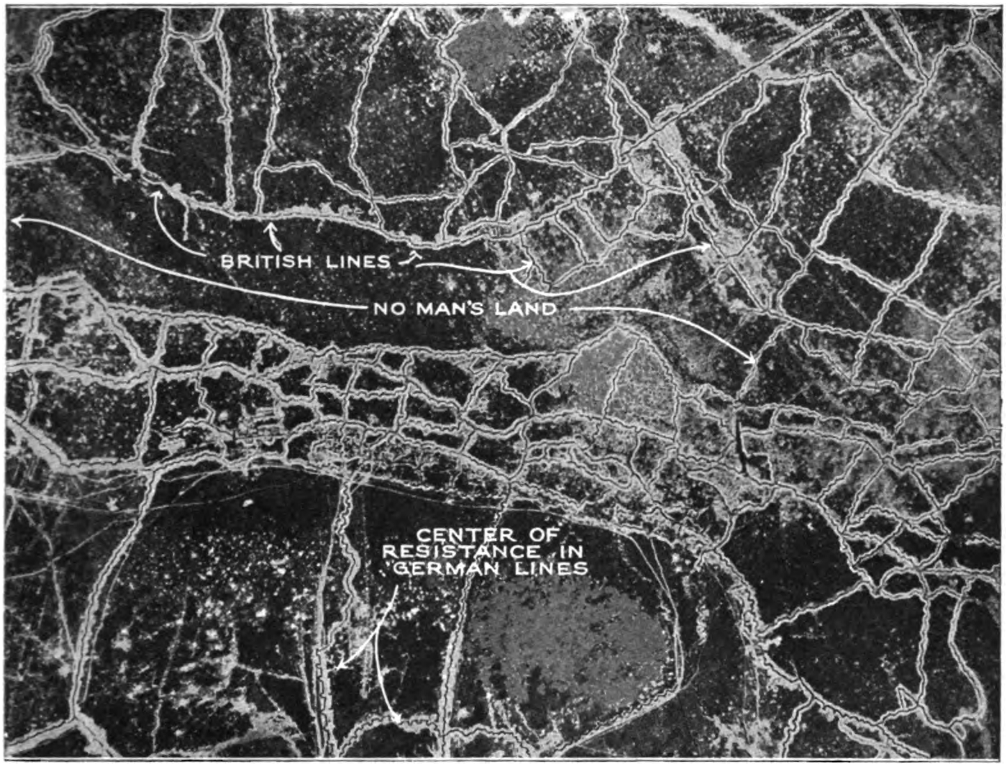
Once the English "lost" 400 men. The charging Tommies got beyond their objective; had their communication lines cut; couldn't be seen from scout planes, and were given up. A series of photographs were made with a special long-focus camera, and on the highly detailed picture their trails were traced through the maze of tracks, and lo! the camera caught the dull glint of their helmets in shell holes where they had dug themselves in.

Always the camera told just how the attacking allied men were digging themselves in, showing at 15-minute intervals the progress of their work of connecting shell holes into a defense trench.

On one occasion the British were preparing for a raid on a large section of German trenches in a quiet sector, and under cover of night brought up "shock" troops along much-traveled roads so that no proof would exist. They lay in hiding all day, and the next night the commanders forbore to send out any scouts for fear their discovery might arouse suspicion in the enemy lines. At the first break of day they sent over a photographer to "snap" the German lines, to make sure that all was quiet. He returned, and his first picture showed two fresh trails running clear across "No Man's Land" from the Hun to the British lines. The British commander, satisfying himself that none of his men had stolen across in the night, knew that a German scout had slipped over and back, and that in all probability he had spread the alarm. Consequently he withheld his attack and sent the photographer back with the special long-focus camera. The new pictures showed a faint widening of the beaten trails between the rear German trenches and the wagon road. Close scrutiny revealed that the Germans had brought up hundreds of fresh soldiers during the night, and had marched them, Indian file, into the trenches—each man walking in his leader's footsteps in order to fool the camera. But the footprints were obviously too large and too deep for one man, and showed the trick.

The British called off the attack while the photographers searched the German lines for miles around to discover where the reinforcements had been secured. Ten miles to the east, they found tracks made by men walking in the same way, Indian file, from the trenches out to the wagon road, evidently to motor trucks. Here, then, the line had been weakened, and acting promptly, the British commander ordered an attack in this sector with the result that the lightly held trenches were captured.

Trench photographs betrayed the enemy's excavations in that it showed where he was putting his soil. It was the German custom, when sinking a mine under "No Man's Land," to carry the earth back and scatter it on the tops of trench parapets, or on the rear slope of a parapet where it would be unnoticed. The color of this fresh earth showed in photo prints, or if it had dried out before the camera caught it—a rare thing—it would show because the parapet would be unnaturally high. When the photographers detected this, they knew a mine was going out in the vicinity, and immediately the



Through Networks of German Trenches, Like This, the Allied Camera Men Persistently Hunted to Find Their Centers of Resistance. These Were Strongly Fortified but Not Conspicuous Positions Which the Huns could Hold Even if the Remainder of the System was Swept Away by the Enemy, and from Them They could Turn upon the Attackers a Murderous Machine-Gun Fire from Behind. So It Was Vital to Discover and Capture Them before Advancing Farther

allied miners would start a counterexcavation.

So it went year after year, the Germans using much the same methods as the allies in trying to use and to fool the camera. Mechanically the Hun was the equal, if not the superior, of the allied photographer. He had on the whole better equipment, and was about as daring in the taking of pictures, but he was never so shrewd at deduction, never so uncanny in his reading of prints; he never had the detective's eye as did the keener, more quick-witted specialists of the French, British, and American forces.

In cameras both sides were much alike, for no sooner had one opponent introduced an improvement, than the opposition would find it on a captured plane and adopt it. Both sides were eager to shoot down photograph planes, for on the dead man's plates, if they were not broken, they could read just what the enemy was spying upon, just what he was after.

The German lenses were of a brilliancy and correctness that the allies seldom duplicated. True to the tedious accuracy of the German brain, the formulas they employed in making their lenses were true to a mathematical nicety, and the workmanship was flawless. Lens astigmatism was unknown among them. Each part of their 13 by 18-cm. (approximately 5 by 7-in.) plates was equally within the sharpest focus. Their lenses never caused that extra rim of light, known as aberration, about objects.

In focal length, however, they fell far short of the allies, and allowed the latter to ride at twice the height and get equally good pictures. The Hun policy was to fly lower, with a flock of protecting planes, while the allies worked in smaller groups and "snapped" from greater heights.

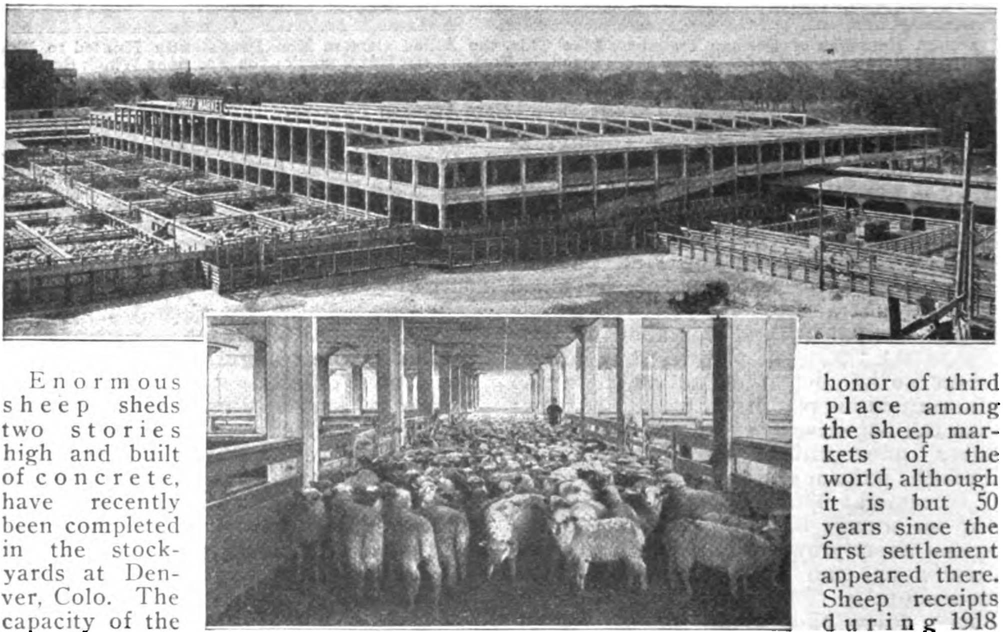
The size of the opening in the shutter was another difference between the combating cameras. In the French, British, and American cameras the size of the aperture was fixed before the airplane left the ground. The Germans had four fixed sizes, which he could interchange in the air. The allied flier had to use whatever he had gone up with. This meant that, if a sudden change in the weather occurred, or if anti-aircraft guns forced the plane higher where the air was brighter, he had to come home. Many a gallant allied photographer, choosing to fly lower and get his pictures at all costs, died in the attempt. The Huns never used the map-making camera as did the allies, and its neglect cost them heavily before the war was done. The German plate holders contained six plates; the French Gaumont holder, 12; the British "C"-type holder, 18, and their "L"-type, in use when war ended, 24. The United States holders, the De Pam, characteristic of the giant scale on which America worked, held 50 plates.

In bravery, the photographic fliers on both sides were equally matched. I have never talked to an allied camera man who did not pay tribute to his German rivals. In the air the Hun was not a Hun, take him by and large. Whatever there may have been of sporting blood in the German nation showed in the air, and in the air only. Perhaps it was that mysterious exaltation, that thrilling call of the upper air, that subdued the brutishness of the typically militaristic German. Throughout the war the opponents forbore, in the main, to attack the hangars and photographic headquarters of their enemy. Chivalry ran strong in the blood of the men who were "riding with Death" day in and day out.

And braving much for the sake of humanity, the allied fliers have performed wonders for science. Their development of stereoscopic and color photography will be applied to everyday uses in infinite variety. What cannot we now learn of inaccessible deserts and polar regions, what cannot we now discover of the vast depths of the Amazon jungles, the fabled plateaus of Tibet, the untrod heart of the Sahara?

When, later on, we smile to recall how primitive and awkward was the world's fumbling with photography before the war, and reflect on its huge growth, may we do proper honor to those of the hard-riding pioneers of the clouds whose bodies came down, but whose souls went straight on up to the Open Gates.

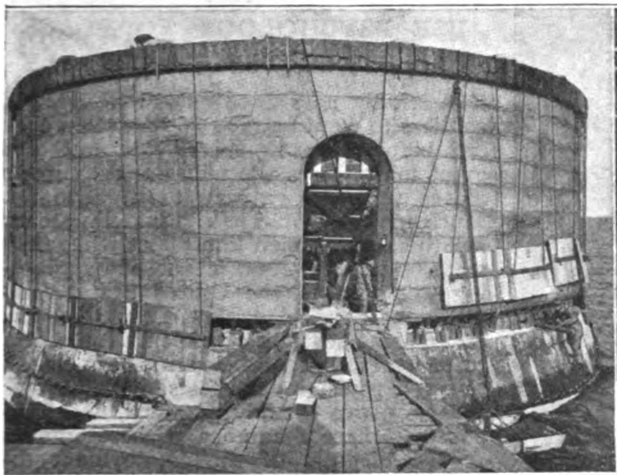
DENVER HAS TWO-STORY CONCRETE SHEEP SHEDS



The Extent of Denver's New Two-Story Sheep Sheds may be Realized from the Upper Picture, in Which One of the Runways to the Second Floor is Seen. The Entire Structure Is of Concrete. The Lower View Reveals the Home Life of Some of the Big Apartment's Temporary Tenants

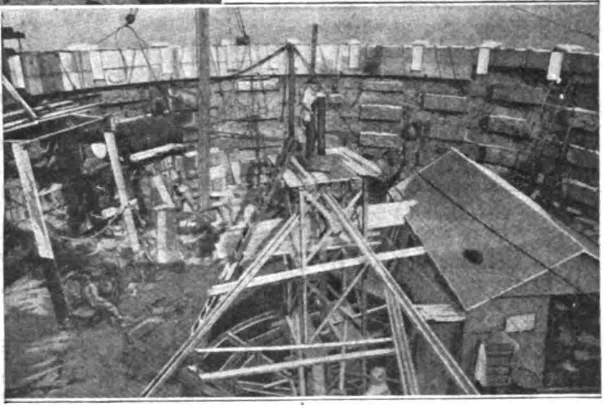
Enormous sheep sheds two stories high and built of concrete, have recently been completed in the stockyards at Denver, Colo. The capacity of the pens is 70,000. These are asserted to be the largest sheep sheds in the United States, and their facilities establish the city's claim to the honor of third place among the sheep markets of the world, although it is but 50 years since the first settlement appeared there. Sheep receipts during 1918 amounted to 34,119 cars and Colorado itself has over 2,000,000 of the animals. The total cost of the new sheds was $100,000.

TILTING WATER-INTAKE CRIB RIGHTED WITH THREE HUNDRED JACKS



House-Movers' Jacks in Place for Righting Tilted Crib, with Wooden Shutters Hung from Top of Masonry to Keep Waves Out: Shutters at the Left are Seen Lowered into Place

The Heavy Wooden Braces Kept the Big Masonry Cylinder from Slipping Sideways When the Jacks had been Inserted in Holes Blasted to Receive Them

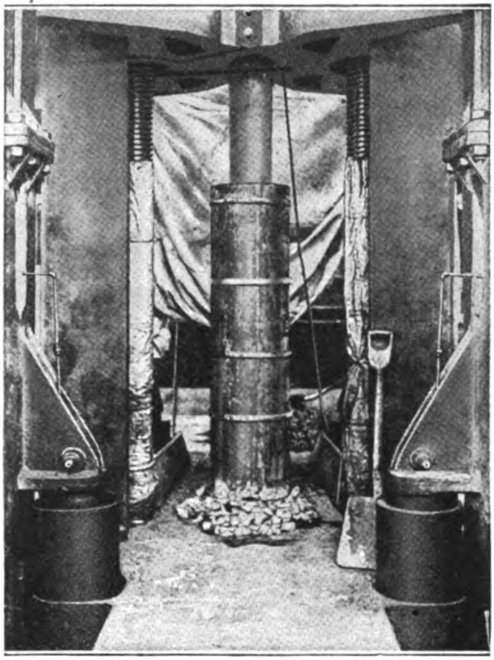


The White Rectangles at the Top Edge of the Crib Are Targets. By Sighting Them the Instrument Man on the Platform in the Center could Properly Direct the Jack Men Below

One of Chicago's waterworks cribs out in Lake Michigan was thrown 18 in. out of level by the settling of the steel and concrete caisson on which it rested. The huge masonry cylinder, 70 ft. in diameter, was righted by inserting under it a complete ring of 300 house-mover's jacks, the depressed side being raised 9 in. and the opposite side lowered the same amount. Openings for the jacks were made by boring two holes through from the inside with a steam drill, and blasting out the space between with light charges of dynamite. Jacks were screwed up tight in the openings thus made, protected with plank bulkheads, and another blast made alongside. This process was continued all around the big circle. Wooden shutters hung on the outside kept the waves of the lake out of the slit. In the center of the crib floor was erected a pipe tower topped by a surveyor's level, and about the upper edge of the stone work were placed 24 targets, or scales, marked in 100 divisions. Watching these, the instrument man called his orders to the jack foreman below, who relayed the instructions to the 12 men working the 300 jacks. Lateral slipping of the masonry was prevented by heavy timber braces inside. When the crib finally had been turned into horizontal position, the jack opening was filled in with brick work, and the job was finished. The whole operation took 30 days, and was completed without damage to any part of the structure.

COMPRESS CONCRETE IN MOLD AND STRENGTH INCREASES

That the strength of concrete increases with its density is well known. That this increase may amount to as much as 50 or, in some cases, practically 100 per cent, is indicated by experiments conducted at an eastern university. A cylindrical sheet-steel form, 5 ft. high and 14 in. in diameter, was used, with a 13-in. plunger for making compression columns, and without a plunger for molding ordinary columns. About 12 in. of regular 1:2:4 mixture was put into the form, compressed at 25,000 to 40,000 lb. (160 to 260 lb. per square inch), another 12-in. layer added and compressed, and so on. Ordinary columns were made by tamping the form full of mixture in the usual manner, which after 28 days of setting failed under a pressure of 1,774 lb. per square inch. Compressed columns resisted pressures up to 2,680 lb. per square inch, a 51-per-cent gain. Greater compacting pressure and longer drying further increased the resistance.


Sheet-Steel Mold and Plunger for Making Test Columns of Compressed Concrete, Which were Found to be 50 to 100 Per Cent Stronger Than Ordinary Tamped Columns and to Weigh Only Four Per Cent More

MAY HAVE SOLDIERS TEACH FARMERS HOW TO PACK

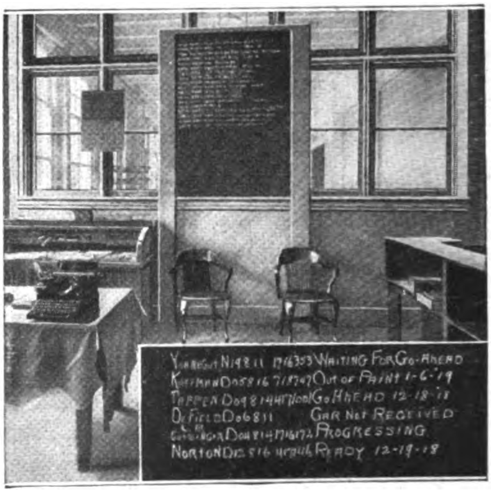
Thousands of dollars are lost every year because farmers are not familiar with the best methods of packing perishable goods for shipment to market, according to statements made at a New York milk investigation. The suggestion was offered that missionaries be sent out to the farms to give instructions and demonstrations in packing. For this work returned soldiers would be available, and could be technically prepared in short order by visits to the big packing plants, where they would learn at first hand the importance of proper methods and the easiest way to pass the information to the farmers.

USE PSYCHOLOGY TO PLACE JOBLESS SOLDIERS PROPERLY

It is only natural to expect discharged soldiers to want better positions than they had before entering the service, but in a great many cases the men are asking for places they are entirely unfitted to fill. Much trouble would be eliminated in placing them if the men knew just what they were fitted for. As a means of overcoming this trouble, the United States Employment Service in New York City has secured the services of a mentality expert to properly classify the various applicants through psychological tests. Should this scheme prove entirely practical, it is proposed to place a number of these experts at the disposal of the employment division.

CAR-REPAIR BULLETIN BOARD ANSWERS OWNER'S QUERY

In the office of an automobile-service station at Indianapolis is a large blackboard, upon which is posted the condition of each car brought in for repair. Notes and changes are made on the board from day to day, so that a glance at it tells the condition of the job. When the impatient owner calls up, the line opposite his name and car number on the blackboard gives the cue for the answer.



Bulletin Board in Automobile-Service Station Lists Each Car by Number and Owner's Name, and Tells Progress of Work on It, So Manager can Answer Questions Promptly

WANTED! NEW BRANDS FOR CATTLE

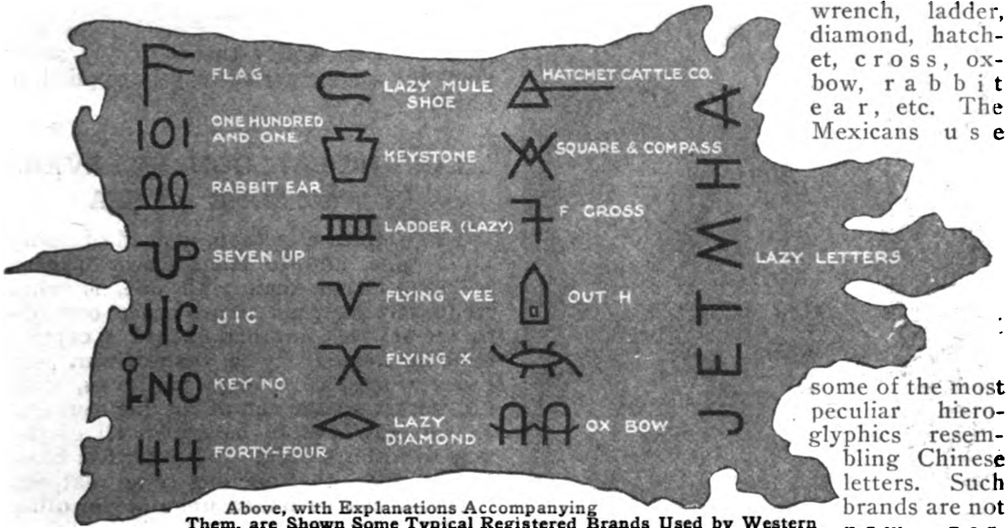
By W. F. WILCOX

THE Colorado State Brand Board has announced that it is "up against it" for new brands. There are between 40,000 and 45,000 different cattle brands recorded in the books of the state, and every day finds new applicants for brands, with none to be had. The various letters of the alphabet and the figures already have been used in about every conceivable combination.

One thing that stamps the Colorado brand board as unique, is the fact that the same brand is let out to but one person, who can place it anywhere on the body of his stock, while other states where brands are recorded, except California, give out the same brand to six persons, each one to use it in a different part of the animal's anatomy. This reduces the possibility of ever running out of brands.

The "101" brand has probably been burnt into the hides of more brute animals than any other. It belongs to a big outfit which has ranged stock in all the Southwest and is one around which many a story and movie scenario has been written.

In Colorado the brand is practically always on the left side, the left hip usually being the selected place. A roped animal naturally falls on the right side so that the left hip is at once exposed to the brander's iron. Some owners run the brand clear across the whole side of the animal to make it more easily read.



Above, with Explanations Accompanying Them, are Shown Some Typical Registered Brands Used by Western Ranchers for Marking Their Stock. The Unexplained Mark Is a Mexican Hieroglyphic

Letters are often used in combinations with a bar above or below, or laid down on their side, when they are known as "lazy" letters. With extensions or wings, they are known as "flying" letters. There are also signs and hieroglyphics used, as the circle, mule shoe, keystone, wagon wrench, ladder, diamond, hatchet, cross, oxbow, rabbit ear, etc. The Mexicans use some of the most peculiar hieroglyphics resembling Chinese letters. Such brands are not now permitted, although those in use for years before recording was instituted are still in use.

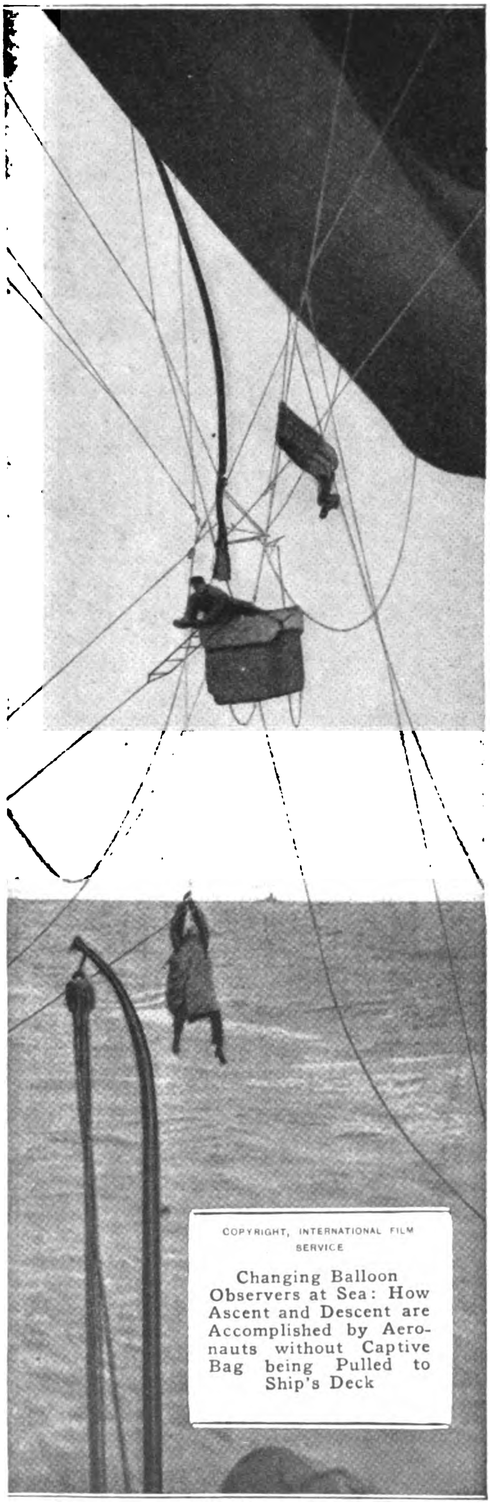
The Colorado brand board and livestock associations have inspectors at every shipping point in the state. No shipment of stock, however small, can be billed out without a state inspector's approval. Each year the state board turns over $50,000 to owners for stray animals which were picked up and shipped out with other brands and reported by the inspectors.

Reading brands is a peculiarly difficult job. In the fall, when the hair is long and the cattle are being brought in from the range by the hundreds of thousands, the brand inspector must be able to distinguish any one of all the 40,000 to 45,000 brands.

EAST-COAST MARL DEPOSITS OFFER CHEAP FERTILIZER

Extensive beds of marl and greensand. rich in potash, lie along the Atlantic coast line from Sandy Hook, N. J., to a point south of Richmond, Va. Discovered in 1768, but practically abandoned after the Civil War, these fields of cheap fertilizer have been virtually rediscovered by scientists of the Department of Agriculture. These investigators have found that large shipments of lime are being brought in from other states for use on farms whose own substratum is calcareous marl in unlimited amounts. Transportation from the beds is the element determining their value, but farmers within a few miles of a deposit would find its excavation a profitable spare-time occupation. The soil absorbs the fertilizing factor from the greensand so slowly that a supply sufficient for a long period may be applied at once.

CHANGING BALLOON OBSERVERS IN WAR ZONE AT SEA



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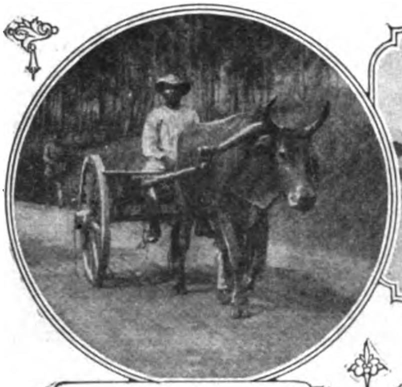
Changing Balloon Observers at Sea: How Ascent and Descent are Accomplished by Aeronauts without Captive Bag being Pulled to Ship's Deck

To go up to a balloon, instead of going up in one, and to come down from a balloon, rather than with one, is what frequently happens at sea when one observer relieves another aboard a captive balloon floated by a man-of-war. In other words, to change observers, it is not necessary for one of the big sausage-shaped gas bags to be drawn all of the way to a ship's deck. It is pulled in close to the vessel that anchors it, so that one observer can be pulled up, and the other let down, by rope and pulley in breeches-buoy fashion. The advantage of this scheme is that time, always important in the war zone, is saved, and considerable trouble eliminated.

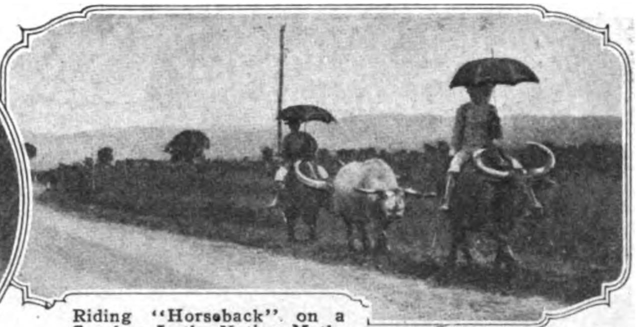
NUMERALS CAME FROM EUROPE, DECLARES ASIATIC STUDENT

That the system of numerals we use and know as "Arabic" had its birth in the ingenious mind of some ancient Hindu philosopher has been accepted as fact so long that to dispute it is to question a cherished tradition. Yet a profound student of Asia Minor and the intellectual characteristics of its various races makes the definite assertion that the Indo-Arabians obtained the symbols with which they are credited, only at third hand, and attributes their origin to the European continent. From this source the Persians adopted them, and later they were introduced by natural diffusion into India and Arabia. Nor did the numerals evolve from alphabetical characters, as supposed, but were designed for their purpose. The investigator's report at least opens the subject to new debate, if it does not wholly dispose of it.

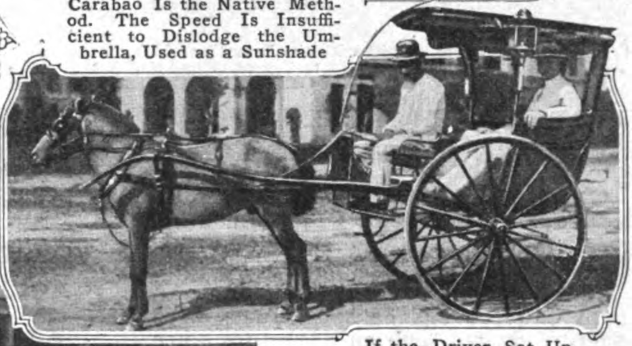
PHILIPPINE TRAVEL—ROMANTIC IF NOT RAPID



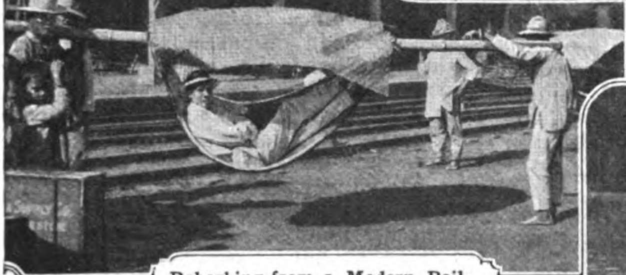
The Steed in Harness Is a "Vaca," Used in the Mountain Regions around Baguio, Philippine Islands, in Place of the Carabao



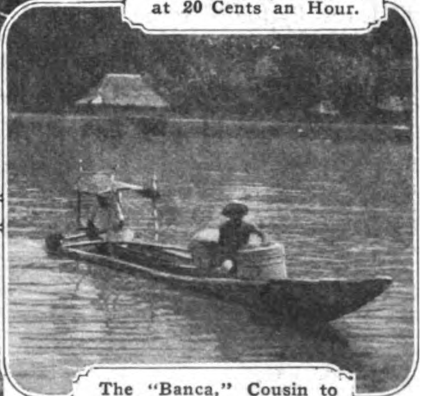
Riding "Horseback" on a Carabao Is the Native Method. The Speed Is Insufficient to Dislodge the Umbrella, Used as a Sunshade



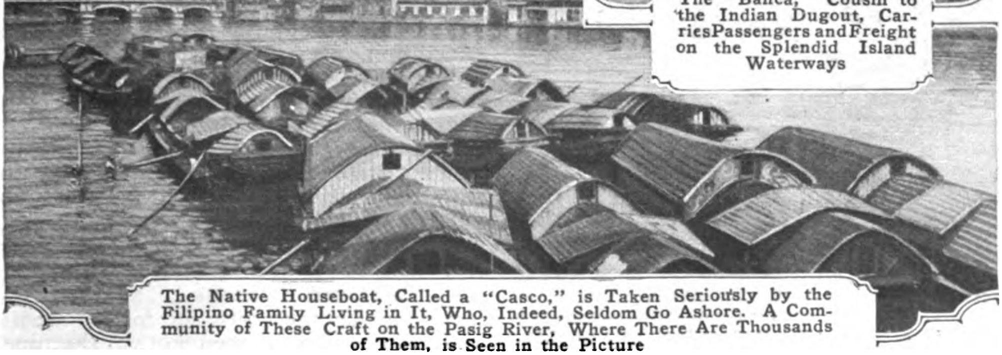
If the Driver Sat Up Behind, It would Be a Hansom Cab; but in the Philippines It Is a "Carromatta," for Hire at 20 Cents an Hour.



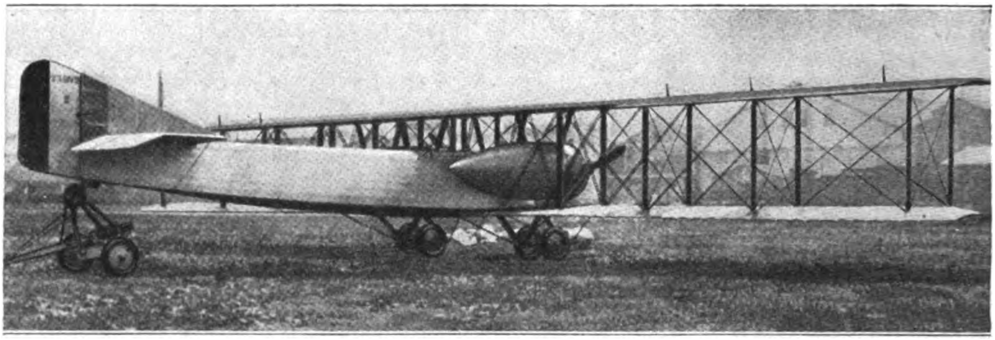
Debarking from a Modern Railroad, One Climbs into a Hammock on a Pole, Crude but Comfortable, and Equipped with a One-Man Top. Pennies Pay the Fare



The "Banca," Cousin to the Indian Dugout, Carries Passengers and Freight on the Splendid Island Waterways



The Native Houseboat, Called a "Casco," is Taken Seriously by the Filipino Family Living in It, Who, Indeed, Seldom Go Ashore. A Community of These Craft on the Pasig River, Where There Are Thousands of Them, is Seen in the Picture



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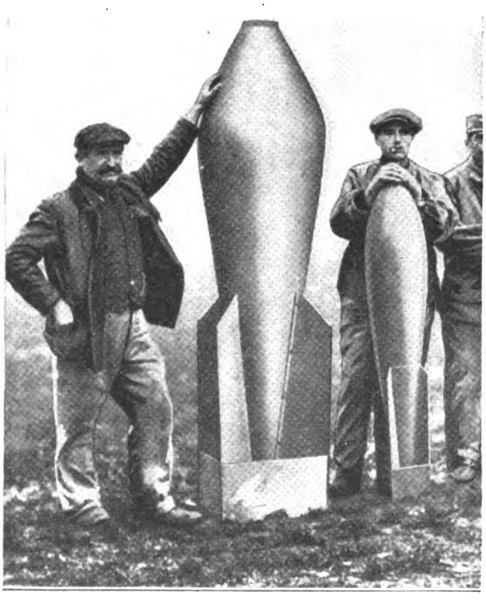
French Bombing Plane Built with the Intention of Raiding Berlin, but Not Completed in Time: It Measures Over 80 Feet from Tip to Tip of Wings and Makes 80 Miles an Hour, Carrying 3,740 Pounds of Gasoline and Oil, and 1,600 Pounds of Explosives

GIANT FRENCH BOMBING PLANE WAS ABOUT TO RAID BERLIN

Civilians as well as men of the air service dreamed, in the days of German aggression, of a bombing expedition that should carry a terrible retribution right to the heart of the Prussian capital. A giant Caudron biplane had actually been made ready for such an adventure when hostilities ceased. The great French plane measures over 80 ft. from tip to tip of its wings. Carrying 3,740 lb. of gasoline and oil, it can fly for 16 hours without landing, making 80 miles an hour and rising to 6,000 ft. For the Berlin raid it would have been loaded with 1,600 lb. of explosives, from a 20-lb. bomb to an enormous aerial torpedo weighing over 1,000 lb. and standing about eight feet high.



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Part of the Cargo of the Biplane Shown Above: Torpedo, Weighing Over 1,000 Pounds Which was to have Left Its Mark on the Prussian Capital

VOYAGE ON ICE PACK UPSETS ARCTIC-CURRENT THEORY

Interesting, although incomplete, information comes from Alaska regarding the exploration of currents in the polar basin by Storker Storkerson, who, with four companions, set out more than a year ago to drift with an ice pack from the north of Alaska to New Siberia Island, off the arctic coast of Siberia. The party has lately returned in safety, although without having reached its expected destination. To all appearances, the explorers have disproved the existence of a strong westward current, heretofore accepted by geographers and others familiar with the region. They began drifting after making camp on an ice cake at 73° north and 146° west. The most northerly point reached was 74° north at 153° west. The most easterly point was 144½° west. This indicates that instead of following a fairly straight course, they were carried around by a great eddy. The expedition was originally planned by Vilhjalmur Stefansson, who was forced to turn over his command to Storkerson because of illness. Stefansson believed that an ice pack, which in that region usually has a thickness of from 30 to 50 ft., would drift at a rate of about 200 miles a month and reach New Siberia. The party started in March of last year from Cross Island, traveled with dog sleds for some distance, and then selected an ice cake and set forth. Seals and polar bears furnished most of the food during the novel trip.

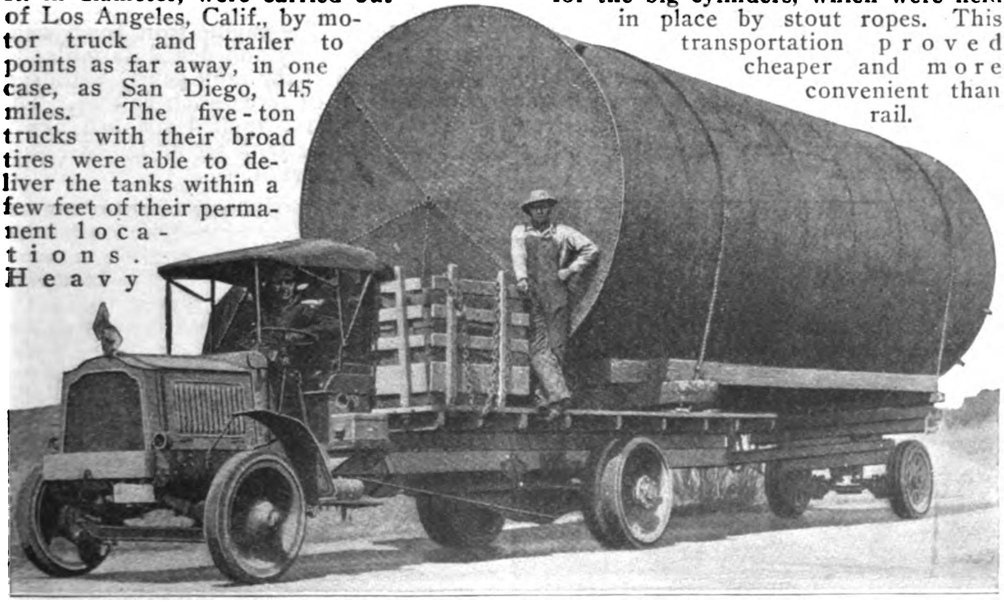
FLOODS CAUSED BY BEAVER DAMS RUIN CROPS

So many complaints have been made recently by Colorado farmers that floods caused by beaver dams in the irrigating ditches had ruined their crops, that the lower house of the state legislature passed a bill sanctioning the killing of these animals when caught destroying property. They have long been under the protection of the state and it is estimated that there are now about 12,000 of them in Colorado. The beaver has always been considered of great benefit. The dams they have built in upper mountain streams have served to store the water and to prevent floods. This has also had a tendency to regulate the feeding of water into the irrigating ditches. Also, those interested in stocking streams with fish have found these beaver ponds very valuable. The fish have first been introduced into the ponds and then, having become properly established, they are permitted to escape or are transferred into the streams it is desired to stock.

Beavers at Work in a Marsh: When a Stream Is Not Deep Enough for Them, They Build a Dam, Often Cutting Down Large Trees for Use in Building It. They are Most Generally Found in Streams Bordered with Thick Foliage

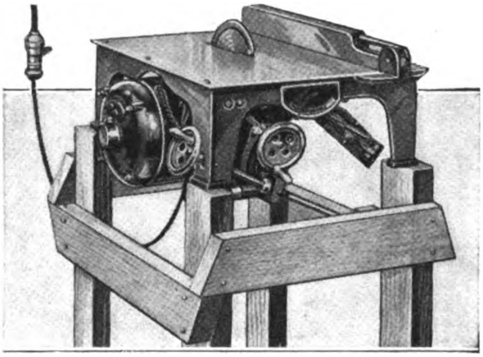
HUGE OIL TANKS HAULED BY TRUCKS

Bigger than the trucks that hauled them, 200 oil tanks, 30 ft. long and 10 ft. in diameter, were carried out of Los Angeles, Calif., by motor truck and trailer to points as far away, in one case, as San Diego, 145 miles. The five-ton trucks with their broad tires were able to deliver the tanks within a few feet of their permanent locations. Heavy timbers laid from the two-wheel trailer to the truck platform made a safe seat for the big cylinders, which were held in place by stout ropes. This transportation proved cheaper and more convenient than rail.



Oil Tanks, 30 Feet Long and 10 Feet in Diameter, were Hauled as Far as 145 Miles Out of Los Angeles, California, on Five-Ton Motor Trucks Equipped with Trailers. The Trucks Were Able to Deliver Their Huge Burdens Right at the Spot Where They were Needed. In This Way 200 Tanks were Transported

BENCH SAW CUTS AT AN ANGLE WHILE TABLE IS LEVEL



Connected with an Ordinary Lighting Circuit, the Saw Makes a Full Two-Inch Cut through Hard Wood

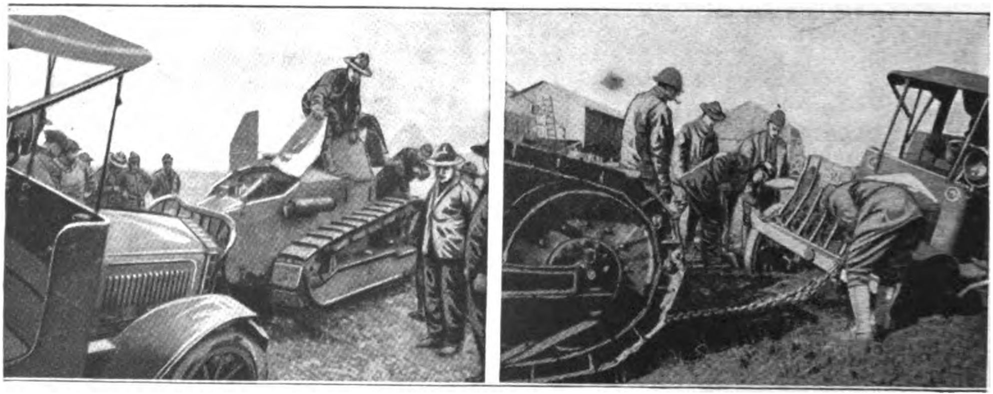
To increase production and reduce cost in woodworking shops, a time and labor-saving bench saw, with features that appear to be advantageous, has been evolved. It is portable, electrically driven, and intended to be connected with an ordinary lighting circuit. Equipped with a motor of ½ hp., it is claimed to be capable of making a full 2-in. cut through the hardest kind of wood. The saw is so mounted that it may be tilted for cutting at an angle while the table remains level. By turning a handwheel until the exact angle desired is registered on a dial, the saw is accurately adjusted in a moment's time. Furthermore, the saw may be raised and lowered so as to either cut or groove. A crosscutting fence built into the machine is out of the way when not in use, while the rip fence is finished on two surfaces and may be used on either side of the saw.

FURNACE SALAMANDER CUT BY OXYHYDROGEN FLAME

The "salamander" found in the bottom of a blast furnace consists of unfused iron, slag, and ore, and is extremely hard. The usual procedure to eliminate it is to drill it with a diamond bit, in an air drill or driven by a sledge hammer. A steel company at Cleveland, when blowing out one of its furnaces for alteration and relining, uncovered a salamander two feet thick. An oxyhydrogen flame was used to cut the accumulation, and it was found that the pressure of the gases blew the molten metal out of the hole.

TRUCKS WALLOW IN DEEP MUD BUT TANKS YANK THEM OUT

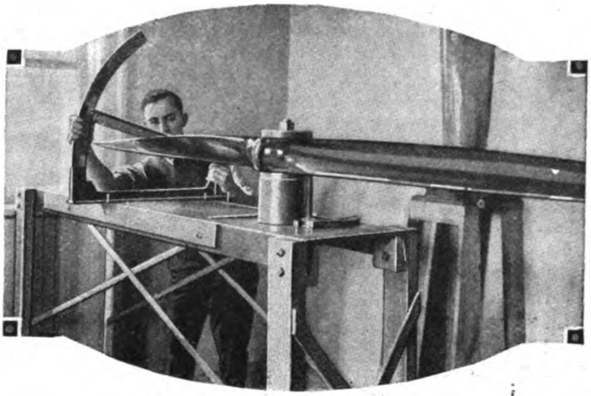
Impromptu demonstrations of the tank tractor's extraordinary energy continue to surprise spectators. At a southern army camp the treacherous marsh soil had a habit of engulfing the lower portions of such vehicles as rashly essayed to cut short the beaten path. When a heavy motor truck thus sank clear to its body, a pair of its mates were quite unable to extricate it. A five-ton French baby tank, however, which was there to help train the tank corps, floated gracefully out on the abysmal mud and jerked the stalled truck out so hurriedly that it slid along on its body, its stationary wheels plowing the depths. Even when the red motor fire engine from town went in up to its waist and defied 25 mules to get it out, the baby tank gently withdrew it at the end of a two-inch hawser. The heavy chain first applied snapped like a thread when the tank set its 130-to-1 gear reduction against it.



French Baby Tanks have Proved Very Useful around a Southern Camp for Pulling Stalled Trucks Out of the Treacherous Soil, Where They were Often Imbedded Up to Their Bodies. Sometimes the Chain Broke, but the Tank Never Failed

HOW THE PROPELLER PROBLEM WAS SOLVED

by E.T. Bronsdon



Measuring the Pitch of an Aluminum-Protected Propeller after Subjecting It for Four Months to the Arid Atmosphere of the "Painted Desert": The Metallic-Leaf Covering Prevents the Wood from Warping, Although the Air Renders an Ordinary Screw Useless in Three Weeks

THE whole truth concerning our DeHaviland-4 war airplane probably never will be published in a popular magazine. When a government learns technical lessons through bitter experience, it sometimes is neither necessary nor advisable to relate the whole grim adventure.

This article does not pretend to reveal the full nature of this last technical lesson. Two faults in the DeHaviland, as it first appeared, came to the direct notice of every Yankee pilot. The first was the matter of faulty gasoline feed, which made the bus prone to fires. This defect was corrected by redrawing specifications, to prescribe one of the two other methods of gas feed; then the epithet "flaming coffin" no longer was deserved.

The second fault was far more mysterious to the pilots, and far harder to correct. When an American plane took the air in France no one could prophesy, with better than an even chance for correctness, whether the machine would return driven by its propeller, or have to attempt a glide and volplane to safety.

A sinister percentage had the experience of mounting to the clouds, starting blithely after Fritz, and then having the wooden propeller suddenly fly to bits! It was found to be no fault of "Archie's," though at first some were inclined to blame hits by stray fragments of high-explosive shell. As a matter of fact, these accidents occurred far back of the lines, and later, when the machine was used at all camps in the United States, similar troubles appeared.

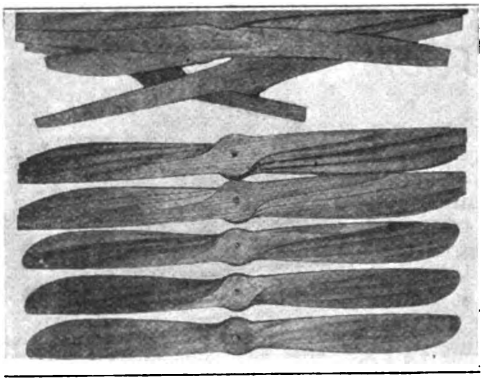
It was discovered, by consultation, that allied plane-makers long since had reconciled themselves to the phenomenon. Sopwiths, Nieuports, and all the rest, were hard on propellers, though with these foreign machines a full 50 per cent of the blades outlasted the lives of the respective planes. With American importations, 60 per cent, or more, of the propellers went to pieces almost immediately.

Usually, when a problem is known and recognized, a Yank goes ahead and finds the solution. Undiscouraged by the fact that four European woodworking companies had tried out every means their ingenuity could suggest—even to attempting propellers molded from solid metal—the Forest Products Laboratory of the United States Department of Agriculture tackled the dilemma.

The Aluminum Leaves are Slipped from the Book, One at a Time, by Turning Back the Pages Halfway and Gripping Them between the First and Second Fingers of the Right Hand, While Holding the Book in the Left Hand, as Shown

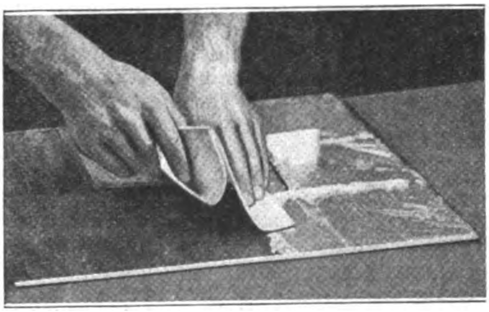
The crux of the difficulty lay in the fact that a propeller is large. It cannot be made of solid metal, because it would overweight the machine. Wood is by far the best material; but wood possesses the bad fault of having a high percentage of moisture content, even when thoroughly air-seasoned, or correctly dried in a water-spray kiln. Green mahogany or walnut—the two best materials for propellers—contain from 40 to 50 per cent moisture. Seasoned wood contains approximately 15 per cent. Propellers always are made of the very finest stock, because perfect pitch and balance are essential. When sent out from the factory, each propeller is known to be perfect in these respects. The moisture content of the wood at this time is 15 per cent.

When subjected to conditions of high humidity, after manufacture, even hard wood, like mahogany or walnut, protected by eight coats of so-called "waterproof" varnish, soaked up some additional moisture unevenly. When used in a hot, arid region, the wood lost moisture just as unevenly. This caused warping and change in the pitch of the blades, but—most important of all—it caused the blades to lose balance. Immediately, when driven at high speed by a Liberty motor, they cracked and burst—and one more airman got the chance of demonstrating his skill at volplaning. In stormy weather, over a country where landing was difficult, or during an engagement with the enemy, this was a nasty hazard.



Indicating, from Top to Bottom, Six Steps in the Manufacture of a Propeller: The Five Laminations of Which a Screw is Built, the Members Glued Together, Appearance after Removing Excess Glue, Roughing Out Begun as Indicated at Hub and Tips, Roughing-Out Operation Completed, the Propeller Ready for Inspection and Varnish

The experts of the Forest Products Laboratory succeeded in solving the problem. After a series of thorough experiments had convinced them that no paint or varnish then manufactured could hold the moisture content of a propeller constant, they invented the aluminum-leaf method of waterproofing wood. At the close of the war, all our airplane propellers were being made in this way.



First Operation in Applying Aluminum Leaf to a Propeller: The End of the Sheet Exposed by Turning Back the Book's First Page is Placed against the Surface to be Coated, and Held Securely in Place with the Left Hand

The method consists in providing a mirrorlike surface first. The bolt holes in the hub are plugged with cork, which is cut off flush and finished exactly as the rest. A filler, consisting of spar varnish, turpentine, and 200-sieve silex, fills the grain pores. Then comes an undercoating of orange gum shellac, which is spread evenly, dried, and sanded lightly. Following this is the coat of size. Extreme care has to be taken in applying the size, otherwise the mirror surface will be marred by fatty edges or runs, which will cause the leaf to rub off later.

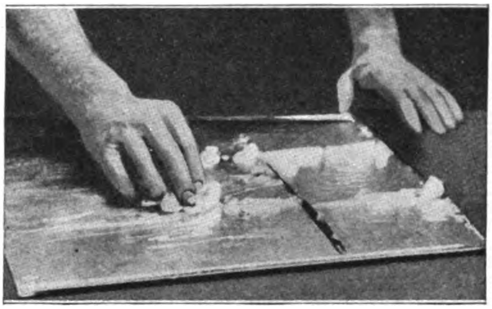
The aluminum leaf used as covering varies in thickness from $\frac{1}{12000}$ to $\frac{1}{15000}$ of an inch. It comes in packs containing 500 leaves. This is divided into books, containing 50 and 25 leaves, respectively, for ease in handling. The size of the metal leaf placed between the pages of these books varies from 4 to 5½ in. square.

The experts who invented the method found that, in applying the leaf, it should be slipped directly from the book by turning back the first page halfway, holding the page between the first and second fingers of the right hand. The book itself should be held between the thumb and fingers, and in such a way that the back of the hand is toward the work when the leaf is applied. The book is bent slightly to prevent the aluminum leaf from drooping. The end of the leaf exposed by turning back the first page of the book should be placed against the surface to be coated and held securely in place by the left hand. The sheet held between the first and second fingers is then drawn back, to allow the whole leaf to come in contact with the surface. The next sheet is applied in like manner, lapping edges with the first, and so on. The best results are obtained where the gilder works from left to right with each row of leaf, because this simplifies the process of completely smoothing the surface. When the surface is finished, the cork can be removed from the hub holes, and these may be treated with 1-in. strips of aluminum leaf dropped in vertically.

On top of the aluminum leaf go two coats of varnish, the first an undercoating similar to the one described previously, and the second an ordinary spar varnish. Then the propeller is ready for use. The total time involved in the process is approximately 100 hours.

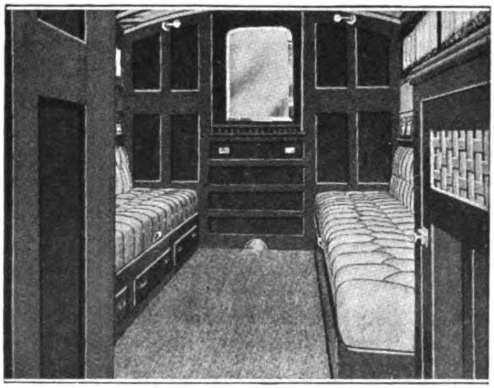
At the Forest Products Laboratory, Madison, Wis., airplane propellers made in this way were subjected to the most exhaustive tests. Chambers were set apart—one a "Sumatra room" (where the air was kept at 100-per-cent humidity), another called the "Painted Desert" (where the air was almost devoid of moisture), and so on, covering all possible climatic conditions—and the blades made to show exactly what they could do. Now, after some of the blades have been in these chambers for several months, they still retain accurate pitch, and little moisture variation is observable.

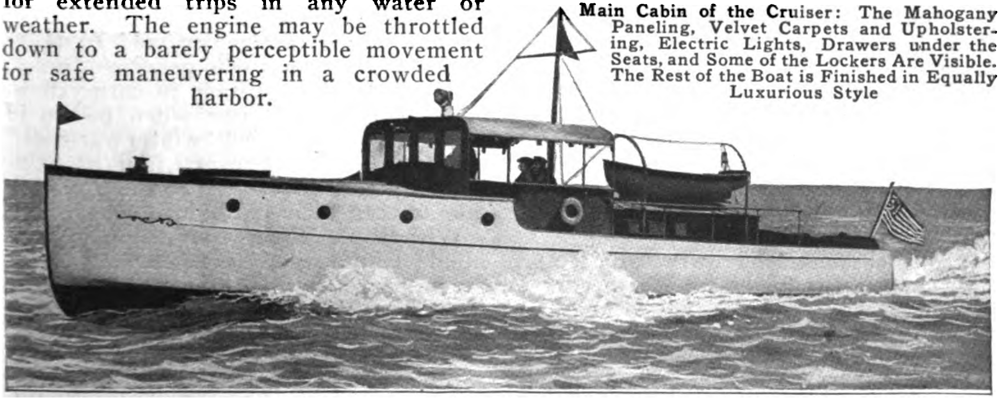
This process is dedicated to the public. Manufacturers who desire to use it in making articles proofed against moisture are at liberty to do so. In pursuance of its splendid policy, the Forest Products Laboratory stands ready to render further details, advice, and assistance on the adaptation of the process to industry, free of charge. Because no such method ever has been recognized before, the use of aluminum leaf should arouse widespread interest.


Smoothing the Aluminum Covering before Applying the Finishing Coats of Varnish: This Is One of the Final Steps in the Process of Protecting an Air Screw against Adverse Atmospheric Conditions

STANDARD FAMILY CRUISER MAKES UNUSUAL SPEED

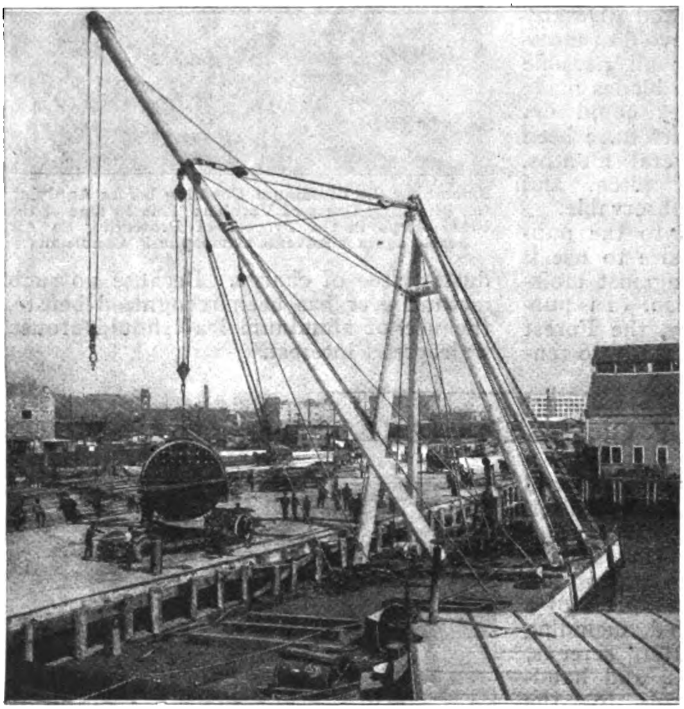
Twenty miles an hour is unusual speed for a heavily built 52-ft. family cruiser, yet that is the regular rating for a standardized boat developed for this season. A party of eight and a crew of two are accommodated, all the conveniences of a modern home being provided, including electric lights, running water, screens, velvet carpets and hangings, and handsome upholstering. Controls for the eight-cylinder engine are carried to the steering column on the bridge for one-man operation. Of modified V-bottom design with sawed frames, steam-bent ribs, and battens backing each plank seam from stem to transom, the cruiser is good for extended trips in any water or weather. The engine may be throttled down to a barely perceptible movement for safe maneuvering in a crowded harbor.


Main Cabin of the Cruiser: The Mahogany Paneling, Velvet Carpets and Upholstering, Electric Lights, Drawers under the Seats, and Some of the Lockers Are Visible. The Rest of the Boat is Finished in Equally Luxurious Style


Standardized 52-Foot Family Cruiser Whose Eight-Cylinder Motor Drives It from a Barely Perceptible Movement Up to 20 Miles an Hour: It Accommodates a Party of Eight and a Crew of Two

NEW DERRICK BARGE CLAIMED BEST ON PACIFIC COAST

A new derrick barge, having a 102-ft. boom and a lifting capacity of 75 tons, has just been placed in commission at San Francisco, and is said by shipping men to be the best on the Pacific coast, with the possible exception of government equipment. The boom has two cable connections, one near the top, for light loads, and the other about two-thirds the way up, for heavy lifting. The barge is fitted with pumps, and oil and water-storage spaces for the benefit of vessels at sea, and is also equipped with bunks for about 40 men in the hold. The engineer is signaled for the various manipulations of the derrick by means of an electric bell.



New 75-Ton Derrick Barge Just Placed in Operation and Said to Be the Best on the Pacific Coast: The Derrick Is Shown Lifting a 42-Ton Boiler

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ℭJapan's commercial growth has been so rapid for the last few years that her public utilities have been unable to keep up with the demand. Telephones are at a premium, and the fortunate possessor of one may sell it, if he wishes, for as much as $250 to $750, the value depending largely on the number.

WHY RIPE APPLES AND BANANAS ARE SWEET

The government laboratories at Washington have recently been trying to ascertain why sweet potatoes are sweet and what constitutes a really ripe banana. This is not merely a matter of curiosity on the part of the official chemists, but is of practical importance in these days of cold storage.

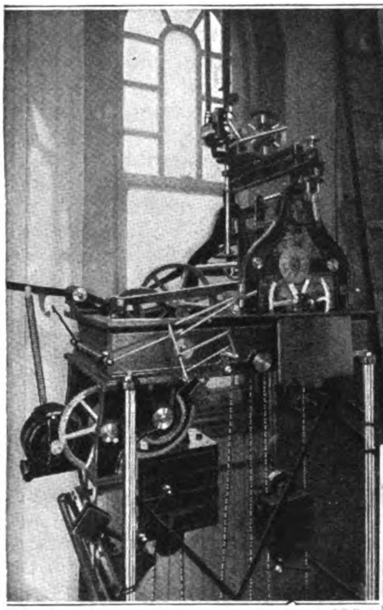
The season of unripe apples and little boys' "tummy" aches will soon be upon us, and we might as well know why the one is so likely to cause the other. It is in apples, as in bananas and sweet potatoes, a matter of starch and sugar. The unripe apple is relatively rich in starch and poor in sugars. As the ripening goes on, the starch gradually changes into sugar. As starch it is indigestible. Before being digested all starch has to be changed into sugar. This process is performed in the human body by the chemical action of digestive juices, especially the saliva.

The process takes place in the fruit itself while ripening. And, strange to say, the natural ripening process is independent of all connection with the plant on which the fruit is borne. This is well known to every gardener who plucks tomatoes or other fruits and places them to ripen in the sun, and to every importer of bananas who gets them green, and puts them in storage to turn yellow.

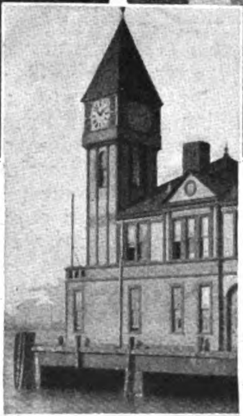
Some apples are ripe when picked in October; others called "winter varieties," have to be kept for several months. Different species vary widely in the time they take to turn their starch into sugar.

With bananas the conversion is most rapid while they are turning from green to yellow. During this time the fruit "breathes" rapidly, giving off large quantities of carbon dioxide. The peel is giving up its water and the pulp is absorbing it. The banana is ripe when the process of change from insoluble starch to soluble sugar is completed.

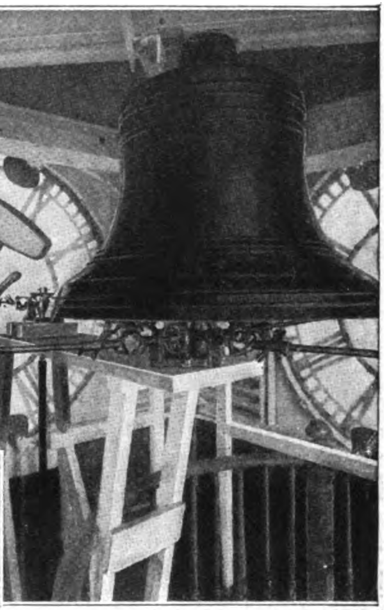
NEW PIER CLOCK IN NEW YORK HARBOR STRIKES SHIP TIME



Clockworks in the Lower Part of the Tower, Occupying a Space of Only 54 Cubic Feet: The Small Electric Motor Which Winds Up the Weights may be Seen at the Left



The Clock Tower on the End of Pier A in the North River, New York: Its Big Bell Strikes Ship Time instead of Landlubber's Time



Bell, Striker, and Dials Are Visible Here, as Well as the Spindles by Which the Hands are Turned by the Works Down Below. Below Each Dial may be seen a Reflector Lamp

A big ship clock, which strikes "ship time," and is said to be the only one of its kind in the United States, has been erected in the tower at the end of Pier A, North River, New York City, the headquarters of the city's Department of Docks and Ferries. The clock and bell were presented by a prominent citizen, as a memorial to the army and navy men who gave their lives in the war.

Owing to the prominent location of the pier, which is the first on the New York side of the river, the clock's bell can be heard all over the harbor. By ship time, the clock strikes "one" at 12:30 in the morning, and strikes one more every half hour until "eight bells," or four o'clock in the morning, is reached. It then begins one bell at 4:30 and strikes up to "eight bells" at eight o'clock in the forenoon, and so around the day.

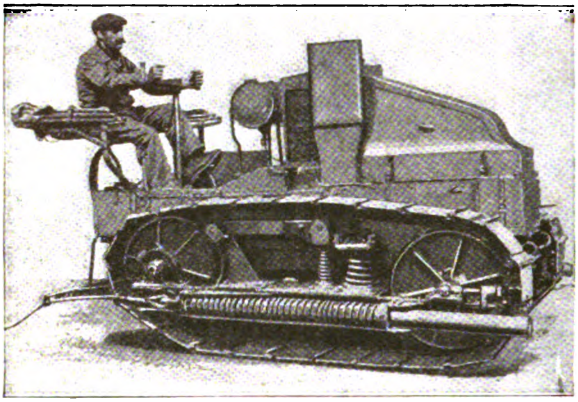
The bell is of bronze, weighs 1,000 lb., and is 37 in. in diameter. It is located in the dial chamber, just behind the four glass dials, each of which is 6 ft. in diameter. At night the dials are illuminated, the illumination being controlled by clockwork, which turns it on and off at set hours.

The mechanism of the clock itself, which is located in a compartment below, is very compact. The weights furnish the motive power and are electrically wound in a very small space. The clock weights and winding mechanism occupy a space only 4 ft. long, 3 ft. wide, and 4½ ft. high.

The clock differs from others of its kind in that the strike is accomplished by one hammer instead of two. The striking wheel is constructed to give the necessary length of blows at each hour and half hour, while an automatic stop prevents the striking from going beyond the proper number.

The operation of the dials, from the clockworks underneath, is accomplished by a system of rods and cogs, which makes it possible to examine the works whenever necessary. The main driving spindles extend vertically upward and turn the horizontal spindles of the dials and the striking wheel.

FRENCH BABY TANK ADAPTED TO AGRICULTURAL USES



BY COURTESY OF LA NATURE

French Baby Tank Made into an Agricultural Tractor by Adding Shock Absorbers Connected to the Drawbar: Heavy Iron Pipes at the Sides of the Truck, Sliding Lengthwise in Spiral Springs, Take Up the Unequal Strains of Haulage

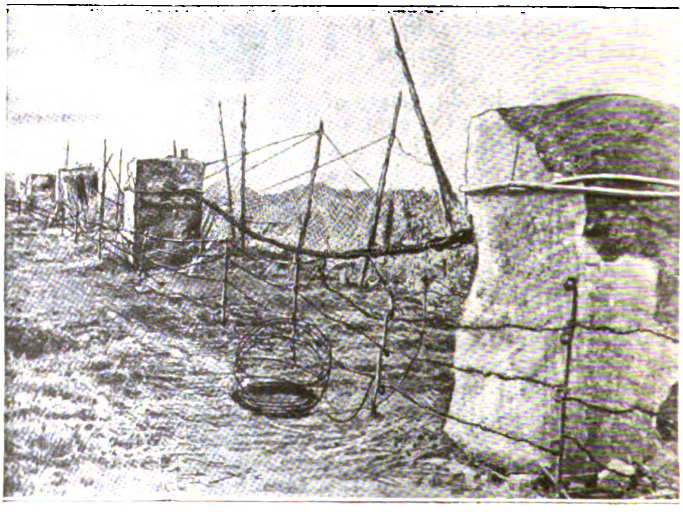
It has been found that the French baby tank, made in large numbers for military use, can be adapted to agricultural purposes with very slight mechanical change. It was merely necessary to provide mechanism for absorbing the shock and vibration at the drawbar when these powerful little machines are used for hauling farm implements and wagons. This was done by mounting at each side of the truck a longitudinal iron pipe sliding in fore and aft bearings. Surrounding the pipe between the bearings is a heavy spiral spring. An eyelet in the rear end of the pipe serves for connection to the drawbar, which thus pulls against the resiliency of the steel springs. With this slight but ingenious modification the baby tractor is ready for serious peace work.

DANISH POULTRY THRIVE ON WAR SUBSTITUTE

The war has given Denmark a poultry-food substitute which seems to be, not "just as good," but even much better than the original. It is a meal made from the blue mussels found in great quantities along the Danish coast. Dried at a high temperature and ground fine, a hen food is produced which packs easily, and develops no objectionable odor, if kept dry. Analysis shows a high percentage of nitrogen and lime; while experiment reveals an increase in egg production of over 100 per cent. Poultry soon overcome a dislike for this new food and will eat it readily when mixed with an equivalent amount of barley bran, and supplemented by vegetables. It is suggested that poultry be broken to this new diet by feeding only a little at one time, and giving nothing else until they have eaten all set before them.

TRY TO STOP YANKEE TANKS WITH STEEL CABLES

As indicating the desperate efforts and devices of the Germans, during the last weeks of the war, to stop the dreaded advance of American and French tanks, a "fence" located in the region of the Argonne-Meuse drive is quite impressive. It consists of huge concrete blocks serving as fence posts, and connected by heavy steel cables, securely fastened by wrapping around the posts. These barricades reinforced the lines of barbed-wire entanglement which had proved so ineffective as tank restrainers, and their construction must have been quite a task.



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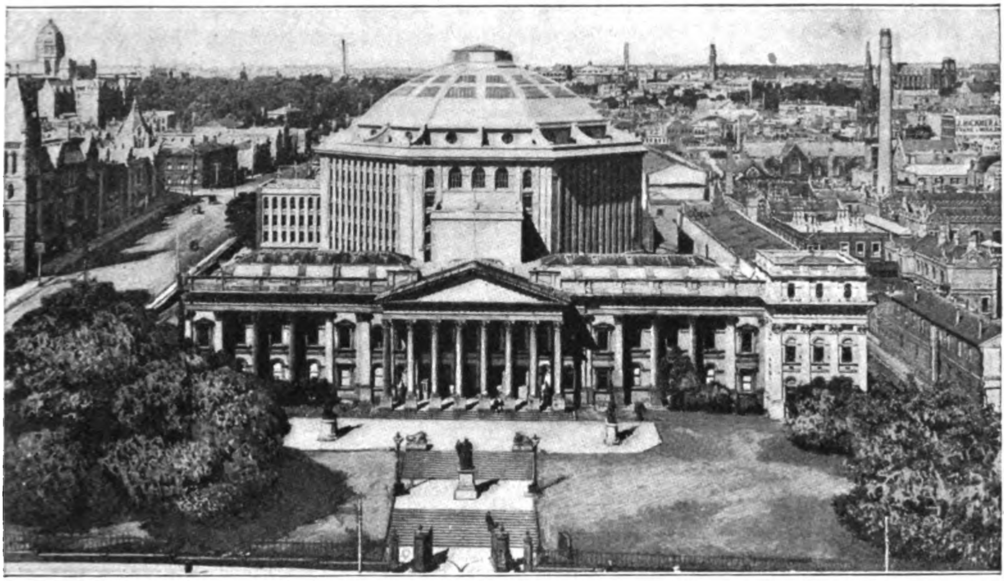
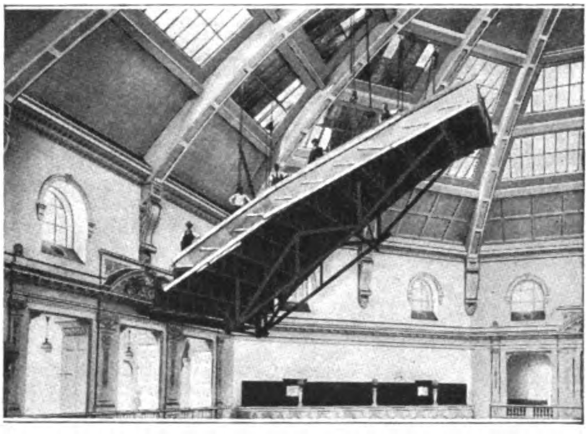
The Germans Expected This Line of Heavy Steel Cable and Ponderous Concrete Posts to Stop the Advance of Tanks of the American and French Forces in the Argonne-Meuse Drive

REPAIR BIG CONCRETE DOME BY USING ODD SCAFFOLD



Public Library at Melbourne, Australia, Whose Reinforced-Concrete Dome is Asserted to be the Largest of Its Kind in the World: It Was from the Inside of This Dome, 114 Feet High, That Plaster Started Falling, Necessitating Relining with Fibrous-Cement Slabs

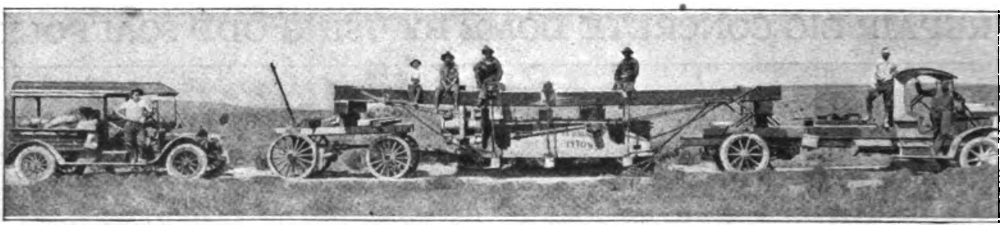
Melbourne, Australia, asserts that its public library has the largest reinforced-concrete dome in the world. Whether or not the superlative is correct, the dome is 114 ft. both in span and height. Unequal expansion of its surfaces for some time has been causing plaster to fall, generally in small bits but with considerable velocity, into the big reading room below. It was decided to reline the dome ceiling with slabs of noncracking fibrous cement, screwing them to wooden plugs driven into holes drilled in the concrete. The scaffolding used for the work was built like a staircase to follow the curve of the dome, and was suspended a hundred feet above the floor, accommodating a large crew of men to speed the work. The dome itself was proved safe by making an accurate miniature model of it, which was thoroughly tested.



Curious Scaffolding, Built Like a Staircase, was Suspended 100 Feet above the Reading-Room Floor, While Cement Slabs were Screwed to Wood Plugs in the Concrete Ceiling

AMERICAN CLUB POSTS SIGNS ALONG MEXICAN HIGHWAYS

An American motor club is posting a foreign country with road signs for the first time on record, it is believed. The club is located on the southwestern coast and has long felt the need for an improvement of this sort in the Lower California peninsula. In consequence permission was recently applied for and received from the Mexican governor, to post signs wherever necessary. The club's crews and cars were recently reported to be at work on the long trip of about 800 miles from the American border.



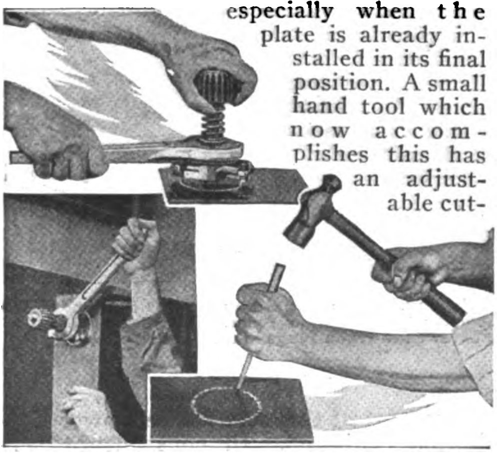
Trailer Improvised from a Wagon and Used with Five-Ton Motor Truck for Hauling 14 Tons of Iron over a Desert Trail: The Iron was Suspended from Heavy Timbers by Bars and Chains, as the Picture Shows

FOURTEEN-TON TRUCK LOAD HAULED ACROSS DESERT

Desert transportation is always a problem out West. Just recently an oil field in Wyoming needed a 14-ton iron engine bed, from which it was separated by 46 miles of sand and sagebrush—and no railroad. A good five-ton motor truck was available, but the load was obviously too much for it. So a strong wagon was converted into a trailer, a pair of long, heavy timbers connecting the truck platform and the wagon bed. The huge mass of iron was suspended from the timbers. Then the truck's driving sprockets were changed to lower the gear ratio, so the engine would not strain itself, and the trip commenced. It was finished in a day and a half, without adventure.

HAND TOOL CUTS BIG HOLES THROUGH STEEL PLATE

Smooth round holes through steel plate are difficult to cut with ordinary tools, especially when the plate is already installed in its final position. A small hand tool which now accomplishes this has an adjustable cutting-blade chuck, enabling it with one set to cut holes from 1¼ to 3 in., and with the other from 1⅜ to 6 in. diameter. A ⅜-in. pilot hole is first drilled through the steel plate and the spindle of the tool passed through and clamped with a nut from the rear, or if that cannot be done the pilot hole is tapped and the spindle screwed into it. A heavy spiral spring holds the cutters against the plate, and the chuck is rotated by a special ratchet wrench, which can be used in corners and difficult places. Regular cutters are heavy enough for 5/16-in. steel, while special blades will cut up to ½-in. steel or 1-in. marble.



New Tool Cuts 1¼ to 6-Inch Holes in Steel Plate. Ratchet Handle Permits Use in Corners, as at the Left, Contrasted with Old Method, at Right, of Drilling and Chiseling

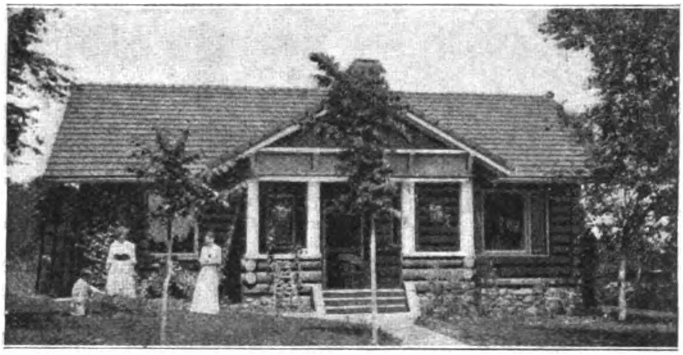
EMBLEMS FOR ALL INVESTORS IN VICTORY LIBERTY LOAN

All subscribers to the Victory Liberty Loan, from the individual buyer of a small bond to the big industrial plant whose employes join in meeting its quota, will be awarded emblems in honor of their patriotic efforts. The Industrial Honor Emblem, for business houses and organizations, is a cambric banner, 30 by 34 in., with a big blue "V" on a white field and a wide red border. Similar to it except in size is the individual subscriber's window emblem on paper, 6½ by 8½ in. When everybody in the household subscribes, the window emblem bears a blue circle inclosing a red "100%," with the words "Household Honor Emblem" in red and "Victory Liberty Loan" in blue.

¶Fine filaments of spun glass are being woven into cloth and felt on a commercial scale at Naples, Italy. The material finds use in the insulation of plates in storage batteries.

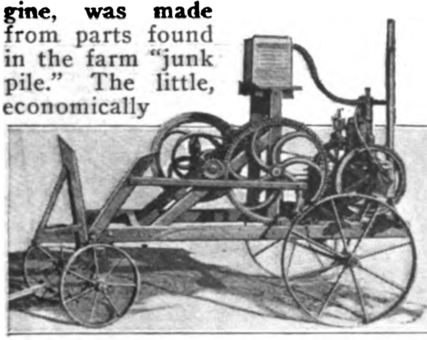
ATTRACTIVE "LOG" BUNGALOW BUILT OF CONCRETE

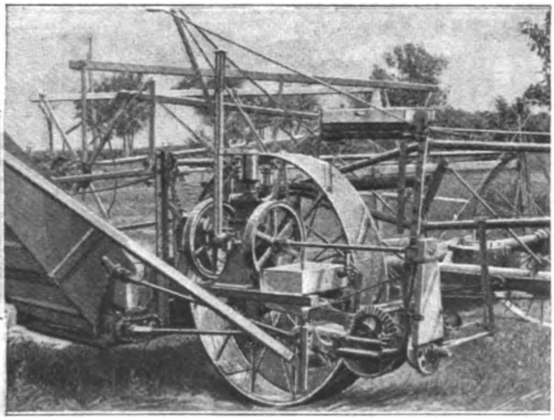
American pioneers have handed down an affectionate regard for log architecture, and many a city dweller would prefer a plain log cabin to a modern mansion for his country home. A builder in Yankton, S. D., has combined both in a pretty and homelike bungalow whose "logs" are made of concrete. The loglike units are precast separately, flat on top, bottom and inside, but with the outside surface molded round and with an imitation bark finish. Ends are cast with dovetails, and interlock at the corners. Ordinary mortar joints are used, and the exterior is finished to a natural effect with a wood-brown stain, preserving in form all the esthetic value of the rustic model, but with the cleanliness and sanitary value of the modern material.


In This Pretty Bungalow the "Logs" Are Precast Concrete Units, Laid Up with Mortar, Like Any Masonry, and Stained Wood-Brown on the Outside to Look Natural

SMALL ENGINE ON HEADER SAVES FARMER'S HORSES

The difficulties of a wet harvest with a horse-drawn header led to the invention, by a Kansas farmer, of an engine drive for the sickle and canvas of the header. A 2½-hp., two-cycle gasoline engine mounted on wood stringers was bolted to the side of the machine and coupled to a series of bevel-and-chain reducing gears. A clutch of automobile type gave the operator control of the power drive from his seat at the rear. All of the extra mechanism, except the engine, was made from parts found in the farm "junk pile." The little, economically operated motor saved the labor of two horses in working the header. A binder was also operated on the same principle. Another application of the engine was running a portable bundle topper, or Kafir header, which has a vertical pivoted blade connected by a pitman to a large gear wheel, turned by the engine at 60 r. p. m. This arrangement cuts a bundle clean at one stroke. Addition of a lever attachment converted the topper into a portable pump jack.


The Little Engine Mounted on the Header Runs Only the Sickle and Canvas, but It Saves the Farmer Two Horses


The Same 2½-Horsepower, Two-Cycle Engine is Seen Operating a Portable Bundle Topper, Whose Knife Blade It Runs at 60 Strokes a Minute. In Front of the Topper Is an Arrangement of Levers for Converting the Topper into a Pump Jack

¶Any bona-fide Swiss manufacturer may belong to a new syndicate for Swiss exportation. Formed to increase Swiss exports, the syndicate intends to make all goods of Swiss origin with the trademark "S. P. E. S."

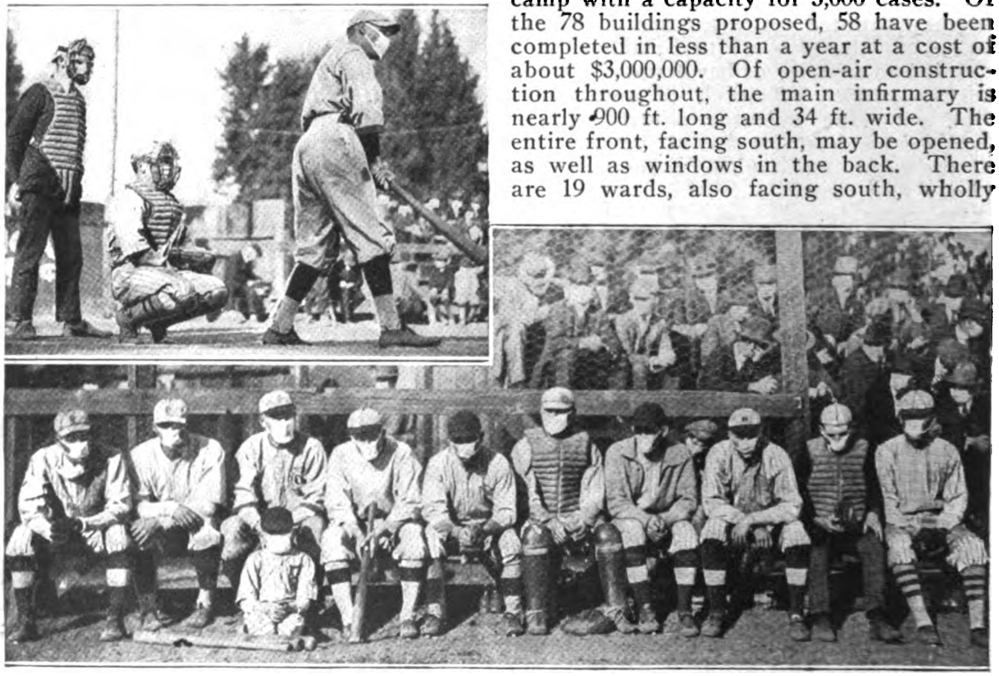
Army General Hospital No. 21 Is the Official Designation for This Big Recuperation Camp at Denver, Colorado Is All of Open-Air Construction, Particularly for the Treatment of Pulmonary Troubles

"FLU" MASKS ADORN PLAYERS AND FANS AT BALL GAME

Late in January last, when the influenza epidemic was rampant in southern California, masks were worn by all the players and spectators at a baseball game held at Pasadena. This may or may not have been the first and only time, as claimed, that such an event has occurred in an American city. The fact remains, however, that for 11 long innings the players indulged in their usual repartee, the umpire shouted his decisions, and the rooters yelled and groaned with perfect form through gauze. And not once, it is said, in all that time was a mask removed—which is not singular when it is made known that blue-coated guardians of civic peace were at hand to arrest and nominate for $50 fines any who might for a moment be guilty of infringing the law.

OPEN-AIR RECUPERATION CAMP ACCOMMODATES THOUSANDS

Colorado being the approved location for natural treatment of lung troubles, Denver was selected as the site for Army General Hospital No. 21, a recuperation camp with a capacity for 3,000 cases. Of the 78 buildings proposed, 58 have been completed in less than a year at a cost of about $3,000,000. Of open-air construction throughout, the main infirmary is nearly 900 ft. long and 34 ft. wide. The entire front, facing south, may be opened, as well as windows in the back. There are 19 wards, also facing south, wholly



Batter, Catcher, and Umpire, at the Top, and One Team and Some of the Fans, Below, are Shown as They Appeared at a Pasadena Baseball Game during the Influenza Epidemic in California

Started May 4, 1918, by the First of This Year 58 of the Proposed 78 Buildings had been Completed. The Camp The Building in the Center Is the Main Infirmary, 900 Feet Long and 34 Feet Wide

open at the front except for fly screens and canvas shades which the patient can adjust from his bed. The wards are unheated, but each patient has a steam-heated, glass-inclosed lounging room. About a thousand soldiers, including some gas victims from overseas, have already been cared for. The camp is expected to handle all the pulmonary cases of the army and navy.

COLORING GLASS BY X-RAYS SUGGESTS NEW ART

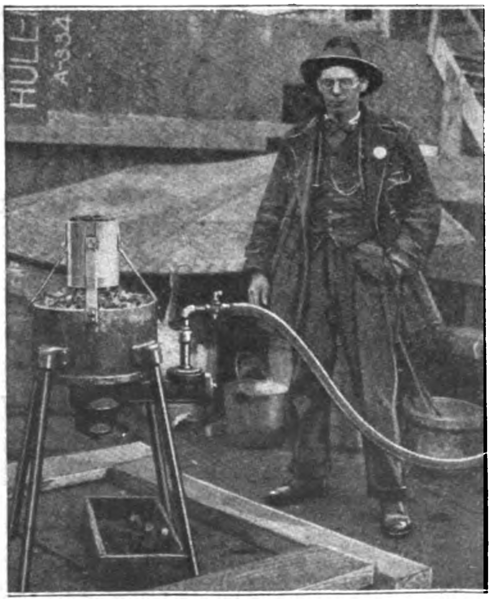
A novel method of coloring glass and similar substances, such as porcelain, quartz, and some precious and semiprecious stones, is a recent development in this field. Noting the gradual coloring properties of sunlight on common glass, the experimenter was able to report the production of more striking results by the employment of an ordinary quartz-tube mercury-vapor lamp, or X-ray tube. A purely chemical change is claimed, varying with the intensity of the light applied. The reported discovery is almost certain to have commercial value.

SHIPS MUST NOW BE EQUIPPED WITH LINE-THROWING GUNS

Line-carrying projectiles and guns, or other approved mechanisms for throwing them, are now a compulsory part of the equipment of ocean-going steam vessels, at least three such outfits being specified for each vessel, the only exception being ships of less than 150 tons gross. This rule became a law February 20, by action of the Steamboat-Inspection Service, under whose jurisdiction all ocean vessels navigate. The regulation which it supersedes applied only to those ships which carried passengers.

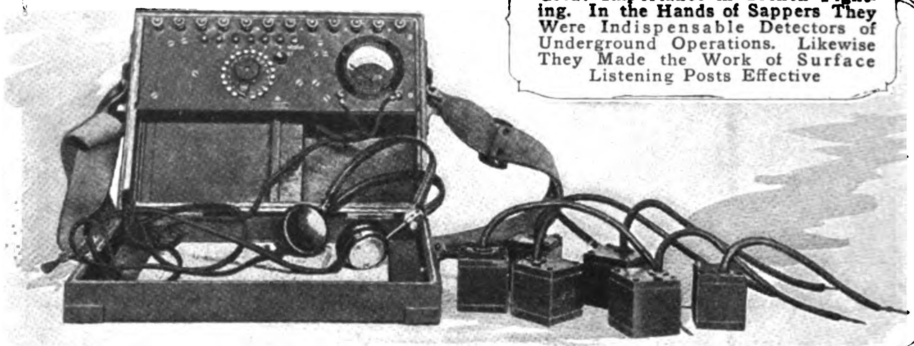
FORGE INVENTED BY SHIPYARD FOREMAN PROVES ITS WORTH

Because operating a fan blower had caused him to suffer from pains in his shoulder, while working as a heater boy a few years ago, a shipyard foreman has invented and patented a rivet heater that tests have shown to be far superior to any now in use. Compressed air is used by means of a diffusing nozzle, thence going through a cone with a number of small holes. The air is subject to control of the cone. An added advantage is a self-feeder for the coke which acts as a gas consumer at the same time, and has proved so successful that the forge may be used between decks without the fumes of gas being felt.

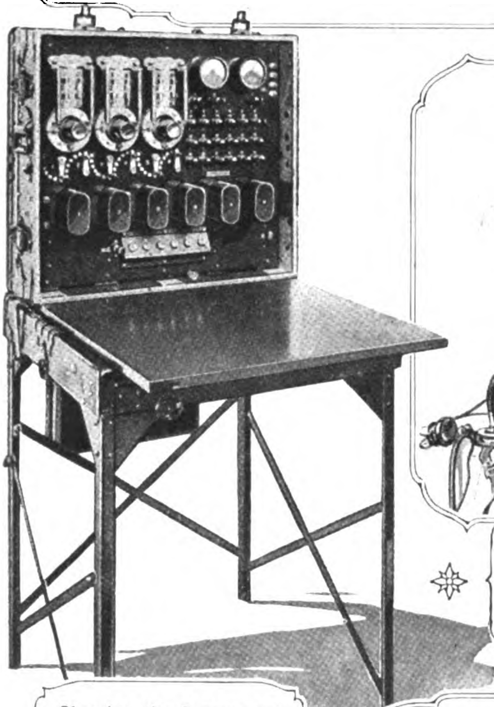


Forge and Automatic Coke Feeder Invented by a Shipyard Foreman

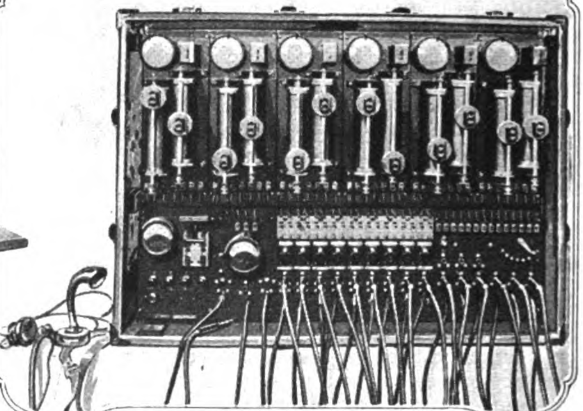
CLOSE-UP VIEWS OF RANGE-FINDING SETS



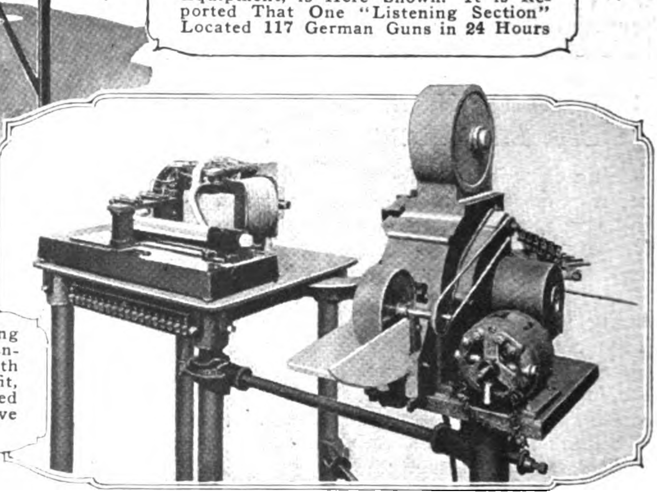
Portable Microphone Sets, Such as the One Pictured Herewith, Were of Great Importance in Trench Fighting. In the Hands of Sappers They Were Indispensable Detectors of Underground Operations. Likewise They Made the Work of Surface Listening Posts Effective



Showing the Instrument Board of a Flash-Ranging Apparatus Which, Used in Conjunction with Telescopes, Enabled Observers to Determine the Positions of Enemy Guns



Sound-Ranging Sets Proved Invaluable for Quickly Discovering the Relative Positions of Enemy Batteries. The Switchboard, Forming a Vital Part of Such Equipment, is Here Shown. It is Reported That One "Listening Section" Located 117 German Guns in 24 Hours



At the Side are Shown the Recording Instrument, Galvanometer, and Tuning-Fork Timing Device Used with the American Sound-Ranging Outfit, Another Part of Which is Illustrated by the Photograph Reproduced Above at the Right

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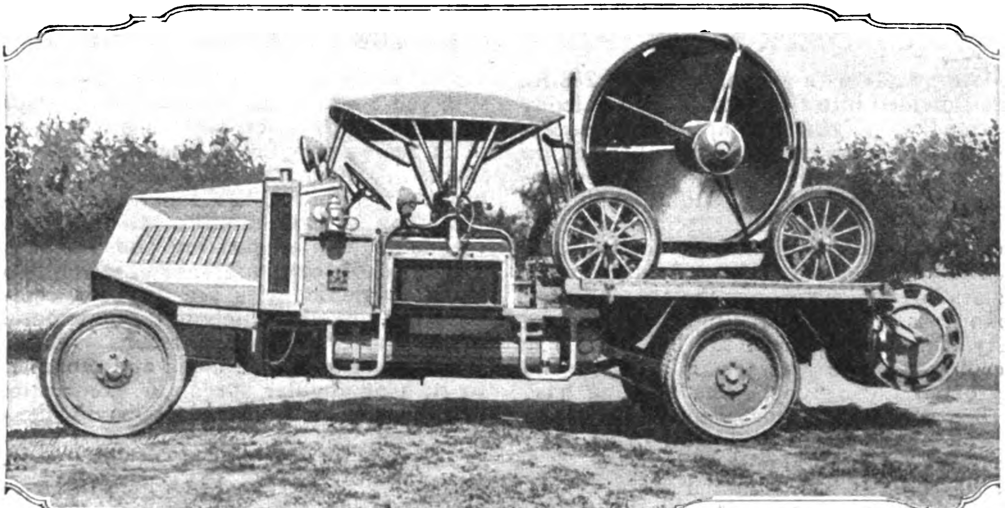
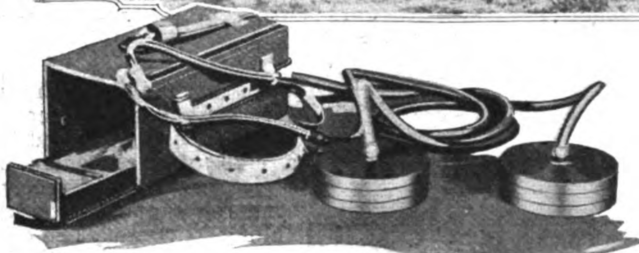
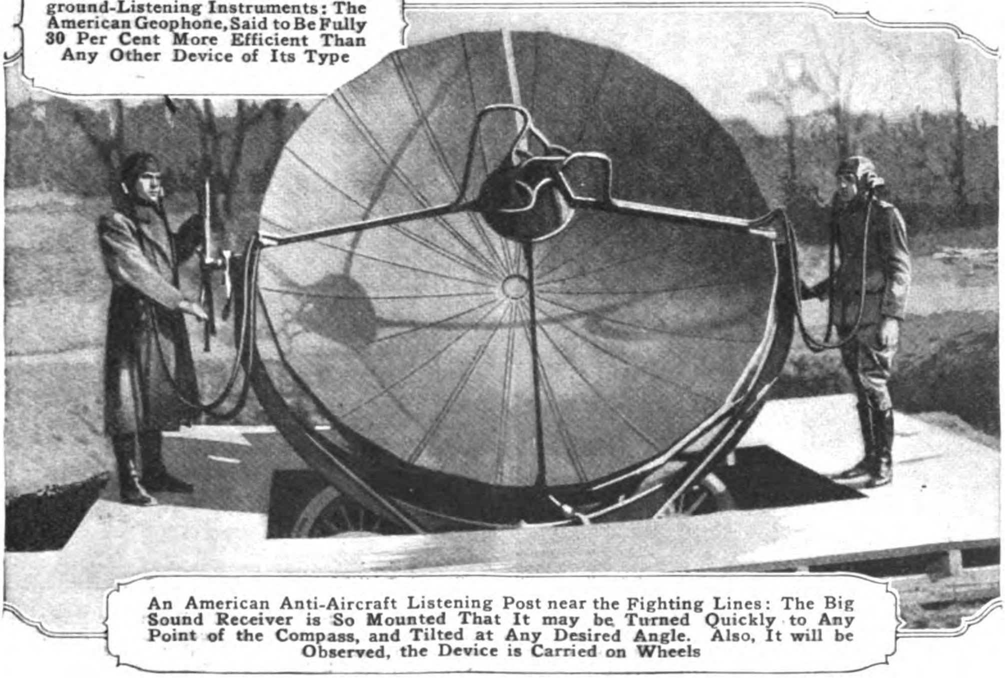
THAT PLAYED BIG PART IN WINNING WAR



Mounted on a Special Military Truck for Quick Transportation: A Portable Combined Sound Detector and Searchlight Used in the Latter Months of the War for Discovering the Approach, and Subsequently the Positions and Courses, of Enemy Aeroplanes



Another of the Effective Underground-Listening Instruments: The American Geophone, Said to Be Fully 30 Per Cent More Efficient Than Any Other Device of Its Type



An American Anti-Aircraft Listening Post near the Fighting Lines: The Big Sound Receiver is So Mounted That It may be Turned Quickly to Any Point of the Compass, and Tilted at Any Desired Angle. Also, It will be Observed, the Device is Carried on Wheels

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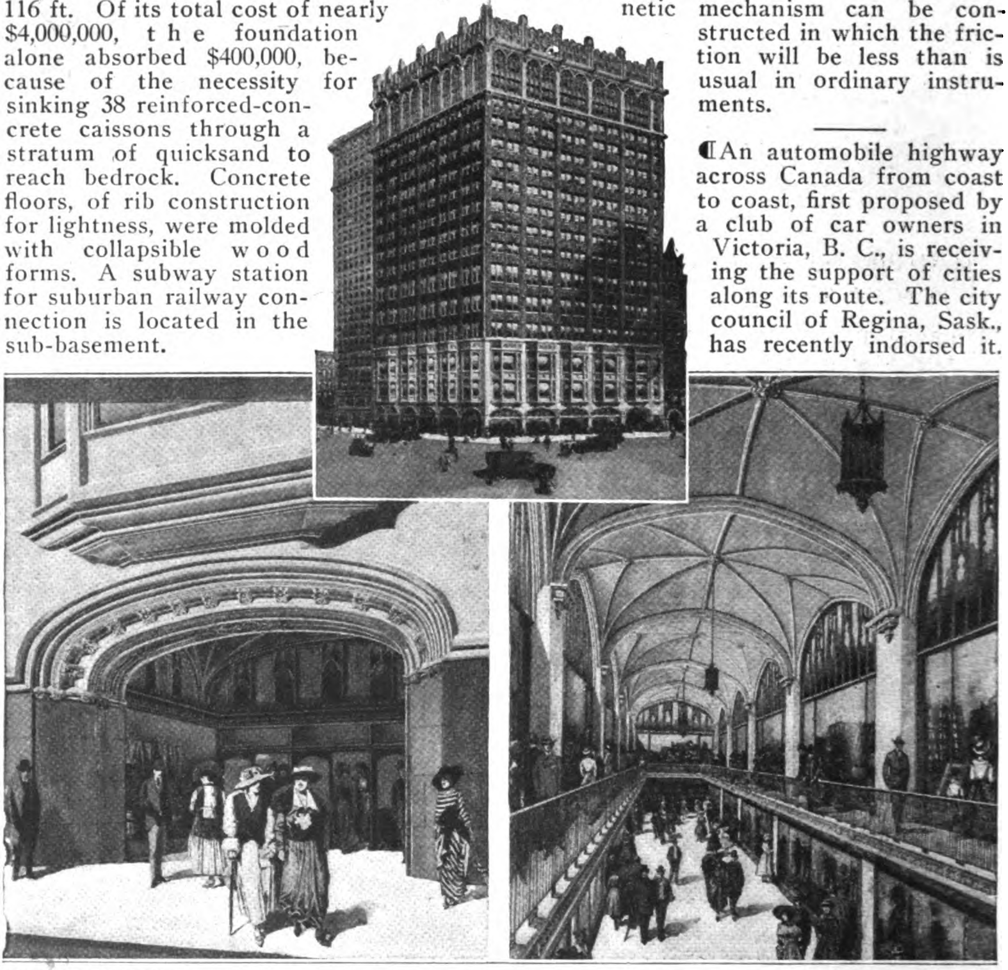
BALCONIED ARCADE FEATURE OF CONCRETE SKYSCRAPER

An arcade with a total length of 238 ft., and divided into two stories by a balcony extending all the way around it, is perhaps the most interesting feature of an unusual store-and-office building now being completed in St. Louis, and declared to be the tallest reinforced-concrete structure ever built. Marble, terra cotta, bronze, old oak, and much plate glass line the corridor of the arcade whose motif is a modified English Gothic, a style used throughout the building. The ceiling of the passage is vaulted and groined Caen stone. The building has 17 stories above the pavement and two below, and measures 134 ft. 6 in. by 116 ft. Of its total cost of nearly $4,000,000, the foundation alone absorbed $400,000, because of the necessity for sinking 38 reinforced-concrete caissons through a stratum of quicksand to reach bedrock. Concrete floors, of rib construction for lightness, were molded with collapsible wood forms. A subway station for suburban railway connection is located in the sub-basement.

CLOCKWORK FRICTION REDUCED BY USE OF MAGNETIC GEARS

Announcement was made recently before the French Academy of Sciences of the apparently successful use of magnetic gears for reducing friction in clockwork. A magnetic clock, driven by an electric pendulum, has functioned regularly for several months. Briefly, the magnetic gear in question consists of a wheel, on the circumference of which two equal magnetic poles are disposed equidistantly, and alternately north and south. With wheels of this character, magnetic trains of gear can be made and mounted to turn at angular speeds in fixed ratio. They behave as ordinary ones having flexible teeth. In this manner a small magnetic mechanism can be constructed in which the friction will be less than is usual in ordinary instruments.

¶An automobile highway across Canada from coast to coast, first proposed by a club of car owners in Victoria, B. C., is receiving the support of cities along its route. The city council of Regina, Sask., has recently indorsed it.

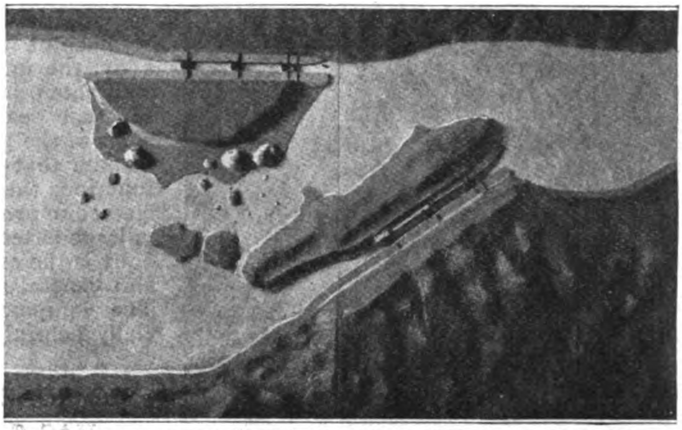


PHOTOS BY W. C. PERSONS

The 238-Foot Arcade with Its Vaulted Ceiling and Full-Length Balcony Pictured at the Right, the Entrance being Seen at the Left, Is the Principal Unusual Feature of St. Louis' New Store-and-Office Building. This Fine Structure, of a Modified English Gothic Type, is Declared to be the Tallest Ever Built of Reinforced Concrete, Having 17 Stories above the Street Level and Two Below

MODEL OF COLUMBIA RIVER AIDS PLEA FOR LOCKS

A "silent argument" which made a substantial impression on the Oregon legislature was used by the advocates of a new system of locks in the Columbia River to prove the merit of their cause. A relief model of the Cascades of that mighty stream was constructed to show that the present locks, on the Oregon side, are hampered in their usefulness by the excessive swiftness of the current at their approaches. Engineers now propose to construct a similar set of locks on the Washington side of the river, which will greatly facilitate navigation to the interior. The model displayed to the legislature included both existing and proposed locks and every detail of the big, unruly waterway at that point, and proved more comprehensible than a view of the river itself.



Relief Model of the Columbia River Cascades, Presented before the Oregon State Legislature as an Argument for New Locks: The Lower Locks, Installed Years Ago and in Constant Use, are Hampered by Swift Water. The Proposed Locks, on the Washington Side, Are the Upper Ones in the Model

EQUIPMENT STANDARDIZATION UNWISE, SAY RAILROADS

Standardization is an attractive project in any field of applied mechanics. The proposal of the railroad administration to adopt standardized equipment for all railroads under its control, however, has elicited expert opinion that such a course would not be good practice. The efficient performance of a locomotive, for example, is governed by such factors as the nature of fuel available, weight of rails, and strength of bridges, length of freight-passing sidings and turntables, and depth of roundhouses. Even if these elements were, in their turn, to be standardized, the unavoidable natural features of alinement, and grade conditions, differing with each railroad, must be considered in the selection of locomotives for the most efficient and economical transportation of goods over that road. Such consideration would be hampered by confining selection to arbitrary types and models.

The French department of industrial reconstruction has replaced the department of munitions. The minister in charge will distribute among French industries the orders placed by other government departments.

BIG LOADS OF COTTON PROVE VALUE OF GOOD ROADS

Southern cotton growers have been quick to realize the commercial value of good roads. Money invested in scientific road building is well spent, as witness the illustration, where a single team is hauling 12 bales, about 6,000 lb., to market. Under former conditions, with mud hub-deep the year around, the same team could haul but one bale, and that only half as fast.

The Way the Southern Grower Hauls Cotton in These Days of Good Roads: In the Good Old Days One Bale Was the Limit

CENSORS TRY CHEMICAL TEST ON SUSPICIOUS LETTERS

Letters are not always what they seem, especially in times of international disturbance. Secret and "sympathetic" inks are as old as chemistry; but there is always a way to discover them. In the base-censor's office in the American Service of Supply, at Paris, all letters that look at all suspicious to the experienced censorial eye are sent to the thoroughly equipped chemical room for a series of searching tests.

Suspicious-Looking Letters That might Bear Secret Messages Written with Sympathetic Inks are Given a Chemical Test in the Base-Censor's Office of the American Service of Supply in Paris

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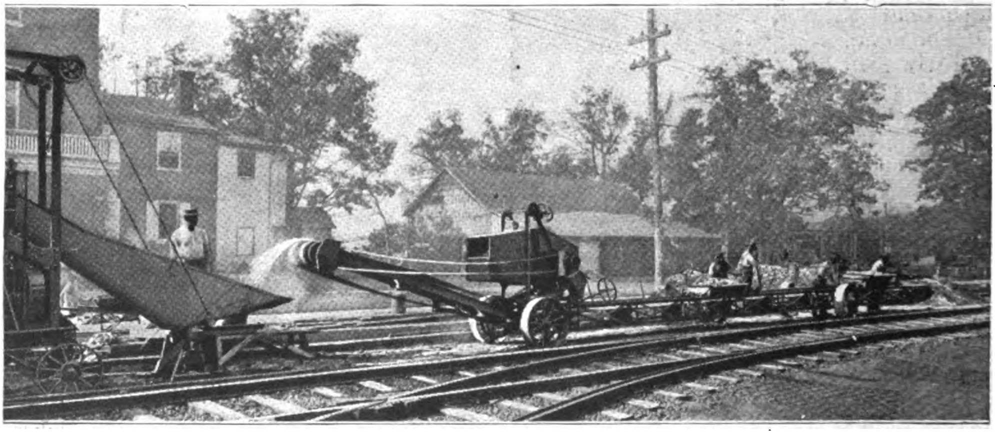
¶Photographs of the graves of American soldiers in France are being taken at the rate of 7,000 a month, and mailed to the nearest relative of each soldier in a cardboard frame with data from his record.

TRAVELING MOTOR-TRUCK SHOW USED FOR SALES PROMOTION

For advertising and sales-promotion purposes, a truck-distributing concern with territory in three eastern states is operating a "traveling motor-truck show." A machine with a large, white, paneled body, the interior of which is fitted as a showroom, is being placed at the disposal of local dealers. The various working parts of the model are exhibited in such a manner that their points of merit and the functions they perform may be clearly explained to prospective purchasers. Printed in large letters on the exterior sides of the body is the essence of the sales argument, and general information about the truck. The equipment is expected to be especially helpful to new dealers.

BIG ROAD-MAKING CONVEYOR HAS CAR TRACK ON TOP

Little dump cars running on a track mounted on heavy iron wheels form one part of a belt conveyor, 60 ft. long, used in road work along the William Penn Highway. The cars, placed at any convenient point on the horizontal, or track, portion of the big machine, are filled by laborers from the piles of material alongside and then rolled to the inclined part of the conveyor. Here their contents are dumped onto the belt, traveling 500 ft. a minute, conveyed to the end of the incline, and discharged into the scoop of the concrete mixer. The conveyor handles 100 cu. ft. of material a minute and because of its wheels readily shifts its location.



The Horizontal Portion of This Big Belt Conveyor Is a Track, on Which Run Little Dump Cars. They are Filled from the Piles of Material Alongside, and Then Rolled to the Inclined Belt, on Which They Dump Their Contents for Final Discharge over the Top into the Scoop of the Concrete Mixer

Part of a Government Flock of Sheep at the Close of a Season's Pasturing: These Animals Showed a Considerably Greater Increase in Weight Than Others That Grazed Open Ranges

INCREASING THE EFFICIENCY OF GRAZING LANDS

By ROBERT H. MOULTON

PROBABLY only a small minority of the sheepmen in this country know that by using a system of fenced pastures, instead of the present open-range herding, they can increase the size of their lambs from five to ten pounds in a single season, make the wool clip from one to three pounds heavier, reduce the acreage now required one-third, and decrease the present loss and the cost of handling four-fifths. These figures represent the records of coöperative experiments carried on for a number of years by the U. S. Forest Service and the Bureau of Plant Industry.

For the experiments, an area of typical sheep range, 2,500 acres in extent, on the Wallowa National Forest in northwestern Oregon, was selected and inclosed by a combination woven-wire and barbed-wire fence, so substantially built that it is practically coyote-proof. This fence consists of a four-point barbed-wire fence on the surface; 3 in. above this a 42-in. woven-wire fence with 4-in. triangular mesh; 6 in. above the woven wire a barbed wire; 8 in. higher a second barbed wire; the posts being set 2½ ft. in the ground and spaced one rod apart. Within this inclosure a normal flock of sheep was turned loose. During three seasons the fence was patrolled each morning between 4 and 10 o'clock by a hunter with hounds, and although, at first, bears, which easily broke the fence, were numerous, the end of the second season had so reduced them that they no longer constituted a menace. As to coyotes, they are still present, but so far as could be ascertained, not one succeeded in getting inside the fence except when the snow lay deep in winter, and they caused no loss whatever.

Hunter and Dog Patrolling the Fence, Which during the First Season was Occasionally Broken by Bears. Coyotes, Except in Winter When Aided by Deep Snow, could Not Pass

To compare the number of sheep that the range in question would support under the two systems, observations were made to ascertain the grazing capacity of approximately 30,000 acres surrounding the experimental area. During the first year the herded flocks used from one and a half to two times as much range per head as the pastured sheep, the second season showing a similar percentage.

The lambs were weighed and marked at the time they were turned loose in the inclosed pasture, and weighed again when taken out at the close of the summer season. The records show that the pastured lambs gained on an average of twenty pounds during the first season of approximately 90 days, while lambs of the same grade handled under herding on the range averaged only 15 pounds' gain during the same period. This difference was increased from 7 to 10 pounds the succeeding seasons. The greatest loss under pasture for the four seasons never reached one per cent, and went as low as one-fifth of one per cent, while the loss from herded flocks near by varied from one to four per cent.

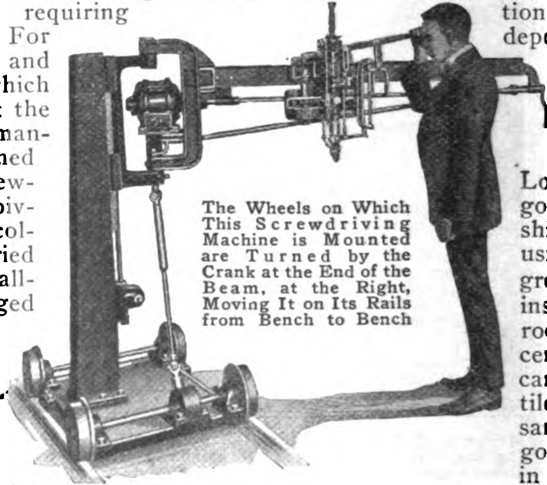
As to the wool growth, no definite figures have yet been arrived at, but the owner of the lambs raised in the pasture during the first season stated that, when they were sheared the following year, the clip was at least one pound heavier than that of any other lambs of the same age and breeding he had ever sheared.

The comparative cost of handling under the two systems depends somewhat upon the locality. It has been determined, however, that one man familiar with handling under pasture could care for four pastures similar to the one in Oregon, which would mean the care of from 8,000 to 10,000 sheep. To handle the same number of sheep under open-range herding in the same locality requires the attention of four men working as herders and two men tending camp. This, of course, does not take into account the cost of building and maintaining the fence. It is figured, however, that a fence should pay for itself in not to exceed five years, and that, with a small cost for maintenance, it should last 15 years. The fence here referred to has not cost to exceed $5 per mile in upkeep in any one year.

In any event, the main advantage of raising sheep in this new manner would lie in the protection it affords the flocks. For under pasture the sheep are free and quiet at all times, they grow larger and can be kept in better condition than when herded in the open; and it is a recognized fact that the growth of wool and its quality is in a large measure dependent on the health of the animals.

SCREWDRIVING MACHINE MOUNTED ON WHEELS

Automatic screwdriving machines are of necessity quite cumbersome, having to carry a driving motor and a magazine for the screws, and requiring a firm mounting. For handling heavy and awkward work which must be finished at the bench, a machine manufacturer has designed an automatic screwdriving equipment pivoted on a vertical column which is carried on a base with ball-bearing, flanged wheels. The spindle bearing, driving mechanism, and screw magazine move laterally upon an I-beam, which swings freely on its pivots and may be raised or lowered. The whole machine is moved on its wheels by turning a hand crank.



The Wheels on Which This Screwdriving Machine is Mounted are Turned by the Crank at the End of the Beam, at the Right, Moving It on Its Rails from Bench to Bench

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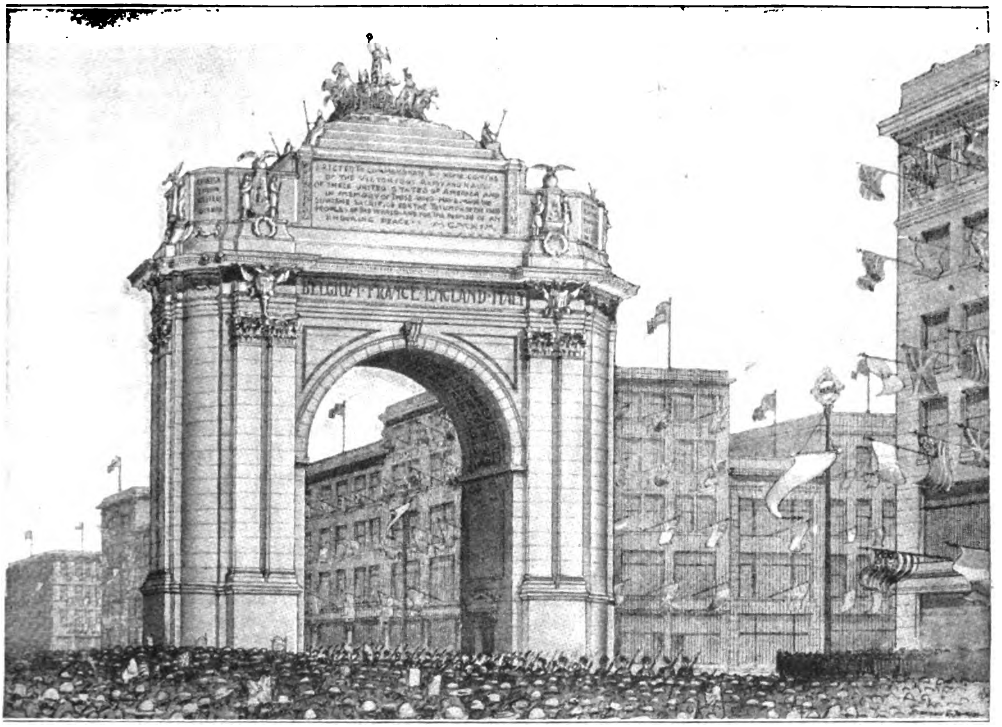
¶ Naples is assured the greatest dry dock in the Mediterranean by the recent signing of all necessary government bills.

CALIFORNIA'S CLAY MOUNTAIN BUILDS SHIPS AND CITIES

Southern California, ambitious to gain fame for something more substantial than a prize climate, now calls special attention to its tremendous deposits of a certain valuable clays. There is, indeed, a veritable mountain of this material 78 miles from Los Angeles. Four government concrete ships are being built, using it as light aggregate in the mixture instead of sand and rock. The district recently sent out 140 carloads of hollow tile, made from the same substance, for a government hospital in Arizona. Pressed brick, paving brick, fire brick, hollow building block, roofing tile, architectural terra cotta, sewer tile, chemical stoneware, underground electrical conduits, and crockery clay are a few of the specific products yielded by the contents of this warehouse of nature. There are 12 varieties of clay in the deposit.



Buffalo's Memorial Arch in Honor of the Returning Heroes of the 27th Division: It is to be Dedicated on Memorial Day. The Arch is Located in the Down-Town District, and will Remain Standing for Two Years. Besides Its Memorial Inscriptions It will Carry the Names of Those Who Made the Final Sacrifice

MEMORIAL ARCH IN BUFFALO TO HONOR FIGHTING MEN

When the fighting men of the 27th division return from foreign battle fields to their homes at Buffalo, N. Y., they will march under a magnificent memorial arch in the center of the down-town section, where 70,000 people pass every day. It will be located just opposite the Soldiers' Monument in Lafayette Square, and will be constructed to stand for two years, according to present plans. The arch is to be finished in time for formal dedication on Memorial Day, and it is estimated that the cost will be about $25,000. Inscribed at the top are the names of French battle fields and the words, "Erected to Commemorate the Homecoming of the Victorious Army and Navy of These United States of America, and in Memory of Those Who have Made the Supreme Sacrifice for the Triumph of the Free Peoples of the World and for the Promise of an Enduring Peace—1919."

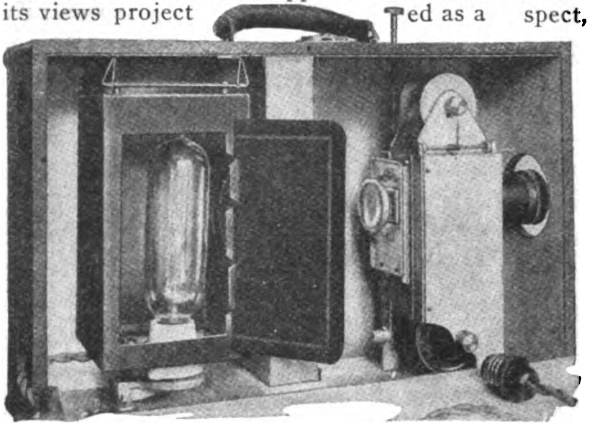
ℭDiscovery of a process for making cotton substitute from seaweed is claimed by a Japanese fiber laboratory.

ROTATING SCRAPER FOR IRON REMOVES RUST AND PAINT

Old rust and paint from such iron structures as ships, bridges, and tanks may be quickly removed with a revolving scraper, run by electric motor. The tool will clean badly incrusted surfaces at the rate of 30 seconds to the square foot, or even faster. The ½-hp. motor, either placed on a small truck or suspended at a convenient point, turns a flexible shaft 4,000 r. p. m. The tool consists of a triangular hub, at each corner of which four hammer bars are pivoted, held radially in action by centrifugal force. These bars, at full speed, strike 48,000 glancing blows a minute.

LANTERN USES "SLIDES" MADE ON MOTION-PICTURE FILM

With the usual apparatus a motion-picture film cannot be stopped and one of its views projected as a still picture, because the heat of the concentrated rays would instantly destroy the film. Nevertheless, the fine quality of the standard motion-picture stock, despite its small surface, gives even better projection results than the glass lantern slide, and a new form of portable stereopticon takes advantage of that fact. The reels of the machine hold 50 ft. of film, or 800 pictures. Depressing a push button on top of the case advances the film just one picture or "frame." A 300-watt incandescent lamp throws a picture of great brilliancy on a screen up to 10 ft. wide, at any distance up to 200 ft., and because of the system of ventilation a film may remain in focus indefinitely without perceptible heating. Films are light and easily changed, and in both convenience and reliability have many advantages over glass. The machine weighs but 12 pounds.



This Suitcase-Size Stereopticon Projects Views Made on Standard Motion-Picture Film Stock Instead of Glass Plates. Pictures are Changed by Pressing the Button on Top, but may be Held Indefinitely without Heating

NEW BOILER HEADS MEASURE MORE THAN FIFTEEN FEET

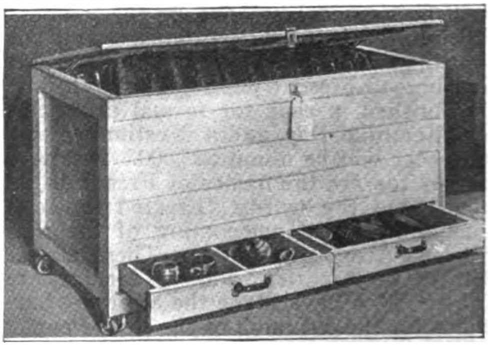
The production of a marine tubular-boiler head 13 ft. in diameter, recorded in the February, 1919, number of Popular Mechanics, has been eclipsed in the same Pennsylvania steel plant. A pair of heads were recently completed which measured 16 ft. 6½ in. in diameter as sheared, and over 15 ft. after flanging. Each head was 1⅛ in. thick and made from a single sheet of steel, and in that respect the performance is announced as a world's record.

ENTIRE STEEL-TRUSS FACTORY SENT ON SHIP TO ITALY

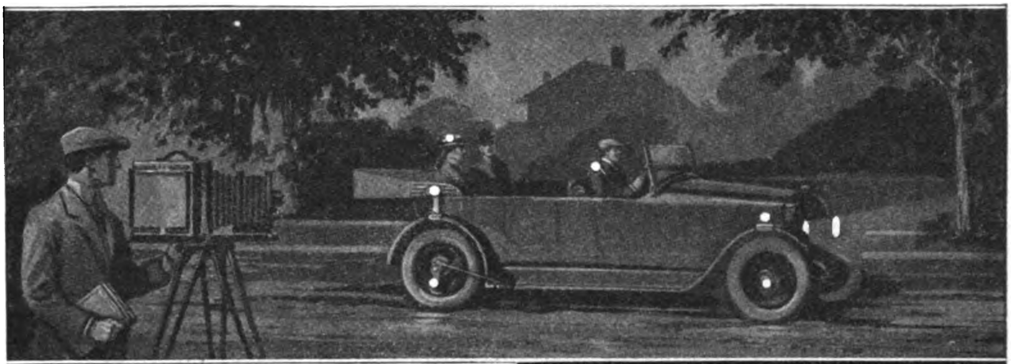
Because an Italian engineer approved of a factory which he came here to inspect, as well as the expanded-steel trusses which constitute its product, an exact duplicate of the whole plant is being shipped all the way to Italy from the outskirts of Chicago. The Italian factory, when the shipload of 340,000 lb. of machinery has been assembled at Savona, will start making steel transmission towers for the high-tension electric lines whose development has a large part in the country's reconstruction plans. The trusses manufactured by the plant are made from steel I-beams peculiarly cut on a large rotary shear and then expanded in a machine specially designed to give them truss form with the necessary strength. Steel interests controlled by the Italian government have advanced $400,000 that the transplanted factory may take firm root in foreign soil.

CHEST FOR EACH CAR OWNER IN REPAIR STATION

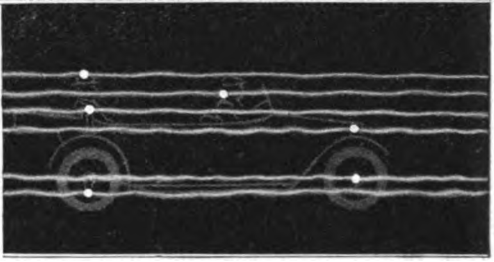
Each automobile owner who brings his car for repair into the service station of a factory branch in Indianapolis, Ind., is provided with a chest in which the cushions and other loose items are deposited. At the bottom are two drawers for the smaller parts. The chest, which moves about on casters, may be padlocked, and is identified with its particular car as long as the latter remains in the shop. This avoids loss or misplacement of parts, and relieves the attendants of responsibility.



One of These Chests Is at the Service of Every Auto Owner Whose Car is Undergoing Repair in an Indianapolis Factory Branch. It Keeps the Loose Parts Together and Prevents Loss



Small Electric Lights are Mounted on Hubs, Fenders, Body, and Other Points of This Car: When It is Driven Past an Open Camera at Night, the Plate Records the Relative Movement of One Part to Another



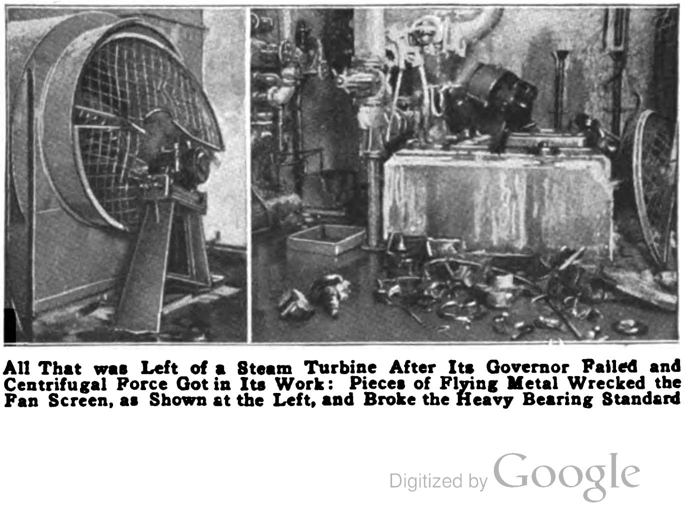
This Is the Kind of Record That Appears on the Photograph. Each Wave in the Horizontal White Lines Represents a Vertical Movement of Some Part of the Car

STUDY MOTION OF CAR PARTS ON PHOTOGRAPHIC RECORD

The relative movements of one part of an automobile to another—of the body to the wheels, the cushions to the body, the wheels to the road—are potent factors in determining economy and comfort. A large manufacturer of luxurious cars has protected by patents a system of making photographic records of car performance in this respect. Small electric lamps are attached to wheels, fenders, body, and any other points desired. The car is then driven past a camera whose lens is left open, the test being made at night. Each lamp is recorded as a streak across the photographic plate, the deviations from a straight line indicating the relative vertical movement of the part on which the lamp was mounted at any instant. Lamps of different brilliancies are used to aid identification on the photograph.

STEAM-TURBINE WRECK CAUSED BY CENTRIFUGAL FORCE

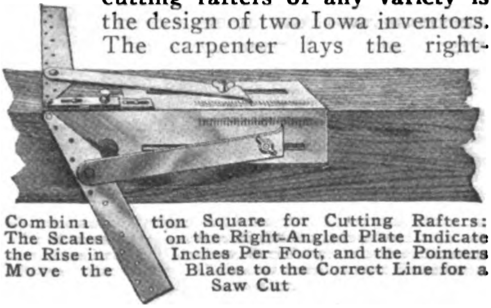
How violent is the disruptive power that lies in centrifugal force was demonstrated to the attendants of a Colorado electric central station, a short time ago, when a steam turbine used to drive a blower fan blew up with all the effect of a burst of shrapnel. The centrifugal governor failed to work; the speed of the turbine rapidly accelerated until the radial pull became too great for even steel to stand, and the whirling metal flew to pieces. Severed portions of the turbine passed through the fan screen with such velocity that the fan, used for supplying forced draft to the boilers, was wrecked, and the heavy standard on the other side broken. The only man injured, an electrician, lost his great toe when his foot was struck by a bulletlike piece of metal which catapulted out of the dizzy machine. Other attendants escaped by narrow margins.



All That was Left of a Steam Turbine After Its Governor Failed and Centrifugal Force Got in Its Work: Pieces of Flying Metal Wrecked the Fan Screen, as Shown at the Left, and Broke the Heavy Bearing Standard

SQUARE FOR MARKING RAFTERS SAVES CARPENTER TROUBLE

A combination square which automatically indicates the proper line for cutting rafters of any variety is the design of two Iowa inventors. The carpenter lays the right-angled plate of the square on one corner of the rafter. Two blades, pivoted at one end of the plate, lie across the top and side of the rafter, respectively. Graduated scales on the two sides of the plate indicate the number of inches of rise per foot of running rafter, and pointers on these scales are connected to the blades. By setting the pointers at the proper figures for any particular rafter, the blades so place themselves that a mark along their edges guides the saw for a cut at the correct angle.



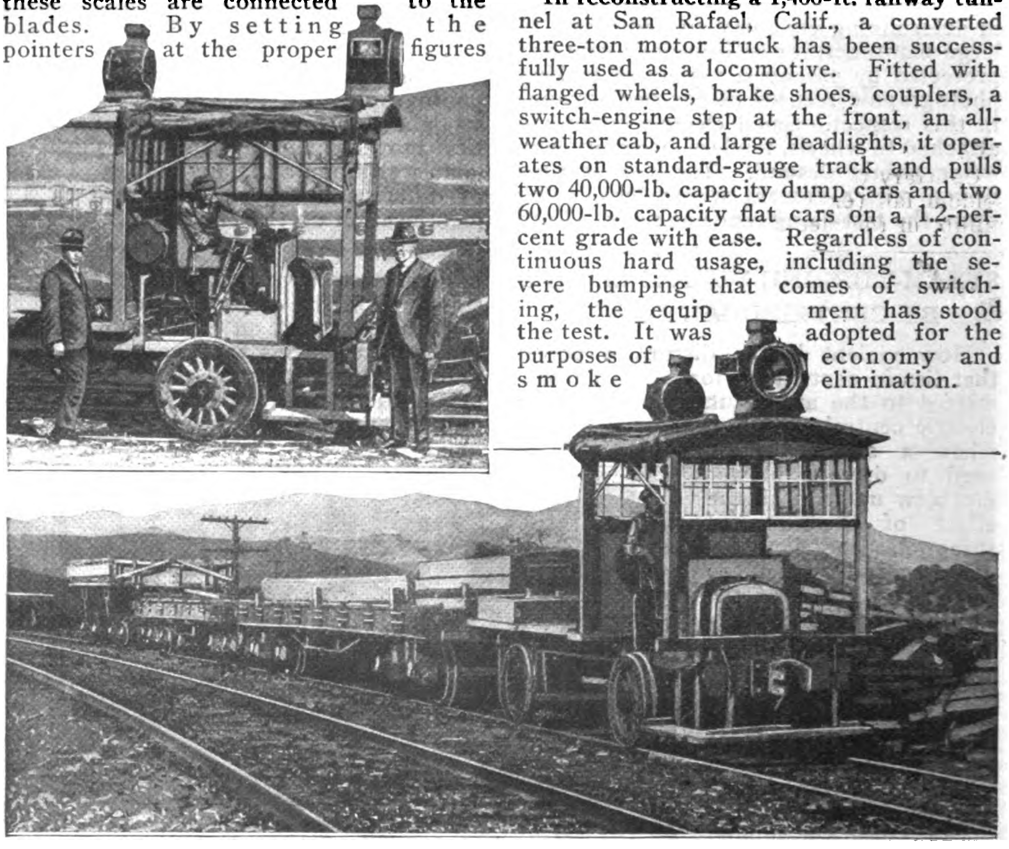
Combination Square for Cutting Rafters: The Scales on the Right-Angled Plate Indicate the Rise in Inches Per Foot, and the Pointers Move the Blades to the Correct Line for a Saw Cut

HASTEN SEASONING OF WILLOW FOR ARTIFICIAL LIMBS

Willow used for making artificial limbs must be carefully seasoned, and the process formerly required from three to five years. By exact determination of the correct temperature and humidity needed for the most satisfactory results, and a study of the circulation in the kiln used for drying, the Forest Products Laboratory has been able to accomplish complete seasoning in 60 to 70 days. Preparation of the willow in proper form for drying also has considerable influence on the time required.

CONVERTED MOTOR TRUCK USED AS RAILWAY LOCOMOTIVE

In reconstructing a 1,400-ft. railway tunnel at San Rafael, Calif., a converted three-ton motor truck has been successfully used as a locomotive. Fitted with flanged wheels, brake shoes, couplers, a switch-engine step at the front, an all-weather cab, and large headlights, it operates on standard-gauge track and pulls two 40,000-lb. capacity dump cars and two 60,000-lb. capacity flat cars on a 1.2-percent grade with ease. Regardless of continuous hard usage, including the severe bumping that comes of switching, the equipment has stood the test. It was adopted for the purposes of economy and smoke elimination.



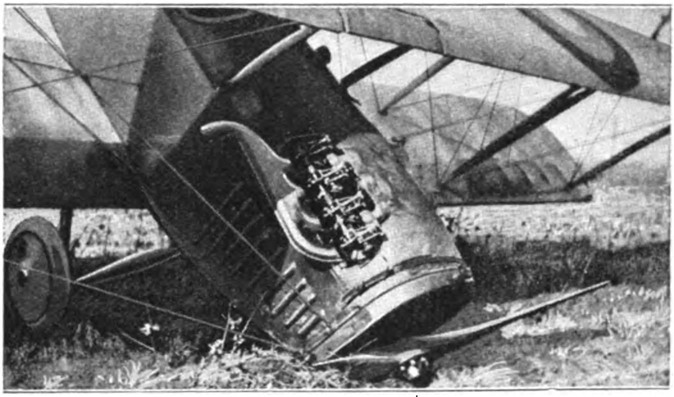
Used in Connection with Railway-Tunnel Construction in the West, This Converted Motor-Truck Locomotive Pulls Four Standard-Gauge Cars with Ease. At the Top Is a Close View of the Cab

WHY AIRPLANES FALL

By ROGERS D. RUSK

Signal Corps Meteorologist

THE biggest problem today in aviation is not how to make airplanes fly, but how to keep them from falling. One of our crack airmen once remarked with a twinkle in his eye: "Flying is perfectly safe—that is, unless you happen to fall."



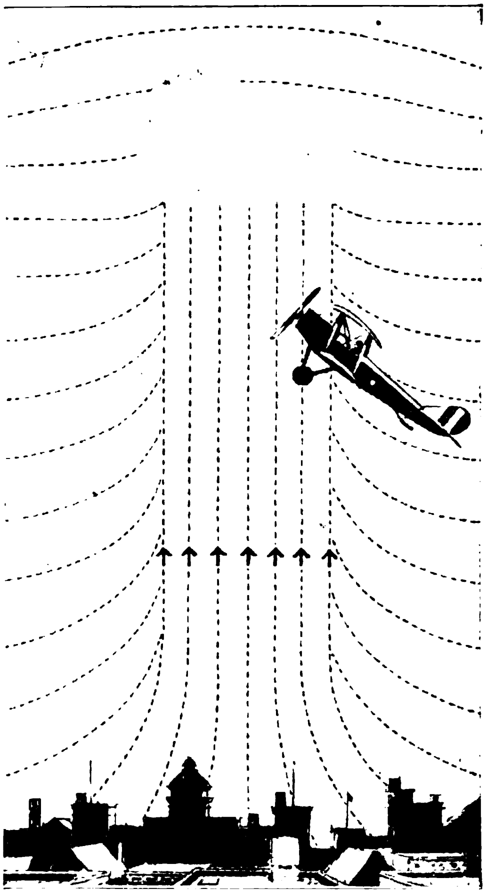
An Aeroplane can Land Anywhere Any Time, but Not Always in Complete Accordance with the Pilot's Wishes. This Shows How One Machine Concluded Flight after the Propeller had Broken in Mid-Air

In one illustration is shown a ship which buried its nose in the ground, and from which the flier barely escaped with his life. The propeller snapped off like a toothpick, and the plane went into a downward spin, from which the pilot tried to extricate himself, but was unable to do so until just before he struck the ground. If he had had a few hundred feet more to fall the accident would no doubt have been avoided. This is a good illustration of the well-known fact that the nearer the earth one flies, although he may feel safe, the less chance he has of saving himself in case of accident.

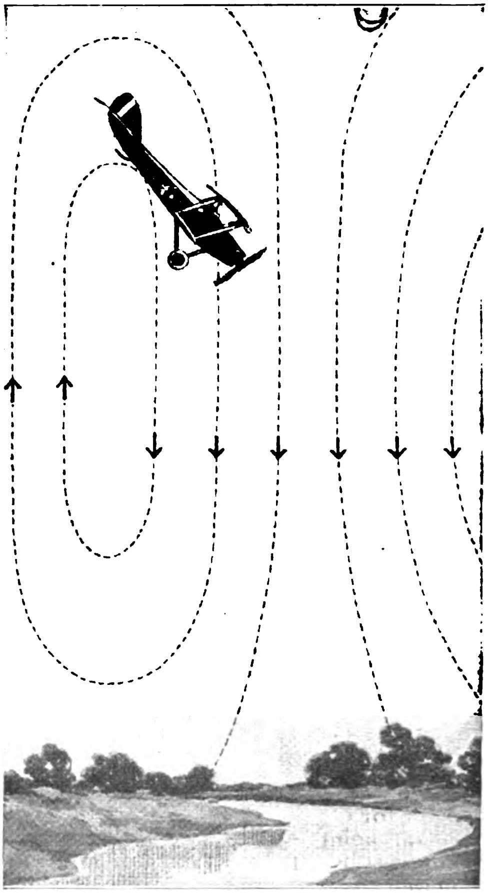
The Picture Presented Here Illustrates an Unfortunate Landing Similar in Effect to That Indicated Above and Caused by Running into an "Air" Hole

Contrary to common opinion, airplanes seldom fall (except in battle) from some failure in the mechanism, such as a wing coming off, or the engine stopping. With the Liberty motor, and other similar high-powered engines of today, more power and speed can actually be developed than the airplane can stand, due to its lightness of construction. Speeds of 100 to 150 miles an hour are common, and it may be said that, barring accidents, an airplane never falls so long as its speed is maintained. If it loses speed, or if the engine stops entirely, the airman can generally glide safely to the ground. The slow Curtiss plane, with a speed of 60 miles per hour, can land in most any field, but the speedier planes, such as the De Haviland, which is twice as fast as the Curtiss, take a much greater space in which to light. Such fields are now being located along airplane routes all over the country. It is the accident, however, which the pilot fears and which every effort is being made to eliminate. The business man of tomorrow who makes a hurried trip from New York to Chicago does not want to take a very big chance of being suddenly and unceremoniously dropped in some farmer's back yard along the way.

Army investigations have shown tha the majority of accidents, except from collisions in mid-air, are due to the flier losing control of his plane, or to irregularities in the air itself which have caused the accident, or which have caused him to lose control. It comes as a distinct surprise to some of us that instead of the upper air being in a uniform state of rest or motion, it is really in a constant turbulence, which is anything but uniform, and we hear such things spoken of as "bumps" and "holes" in the air, eddies and whirls, and cascades and foun-



Illustrating What is Meant by a "Bump" in the Air: An Up-Going Current Caused by the Uneven Heating of the Earth's Surface, Which "Bumps" a Plane in the Manner Indicated



The So-Called "Hole" in the Air Is a Downward Current Occasionally Encountered at Moderate Elevations above Water and Wooded Territories. If Pronounced, It may Cause Trouble

tains. It seems that just as a motorist may run off the road into a ditch, the airman may run into a "hole" in the air—more so as the so-called hole in the air is invisible. It is such irregularities in the atmosphere as these, that the government and the U. S. Weather Bureau are studying and attempting to map every day, just as is done with the weather at the earth's surface.

The term "hole," in the air is very misleading, as there can be no such thing as a hole in the air. There may be points of greater or less density, but the variation is usually so slight as to be negligible, except in the extreme case of storms such as hurricanes, in the center of which is a partial vacuum. What is commonly called a hole in the air is really a downward current of air which causes the airman to drop unexpectedly. Such currents are frequently found near or over bodies of water, or wooded regions, and may extend as high, at times, as a mile in the air. Another illustration shows a plane in which the pilot landed in a startling and embarrassing manner a short way from the Mississippi River. While flying near the ground he felt himself suddenly carried down by an air current, and he was unable to recover in time to rise again.

Bumps in the air are just the opposite of holes, and are due to upward currents of air which are always more or less noticeable on bright sunny days, especially in summer, due to uneven heating of the earth's surface. Such currents are generally found over open land, plowed ground, and even roads. It is interesting to note that these up-currents may usually be detected by the big billowy cumulus clouds that form at the upper extremity of a rising current, due to the cooling and condensation of the moisture in the air. Every such cloud that dots the sky in warm weather indicates a rising current of air and the existence of a bump. The way an airplane is tilted by such a bump is also shown. When this occurs, the pilot must right his ship, and if he does this too quickly an accident may result.

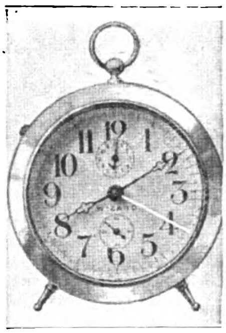
Vertical eddies, and many other peculiar phenomena, frequently occur and are only visible through the motions of the clouds. They may be detected, however, by the use of small balloons set free in the air. Of course these currents are seldom violent except in the case of storms. If such were not the case, flying would be next to impossible. In a thunderstorm the winds rage with almost unbelievable violence, and the unfortunate airman who is caught in one is whirled and battered in all directions, and his ship is frequently torn to pieces. Only a few survivors of such experiences have returned to tell the tale.

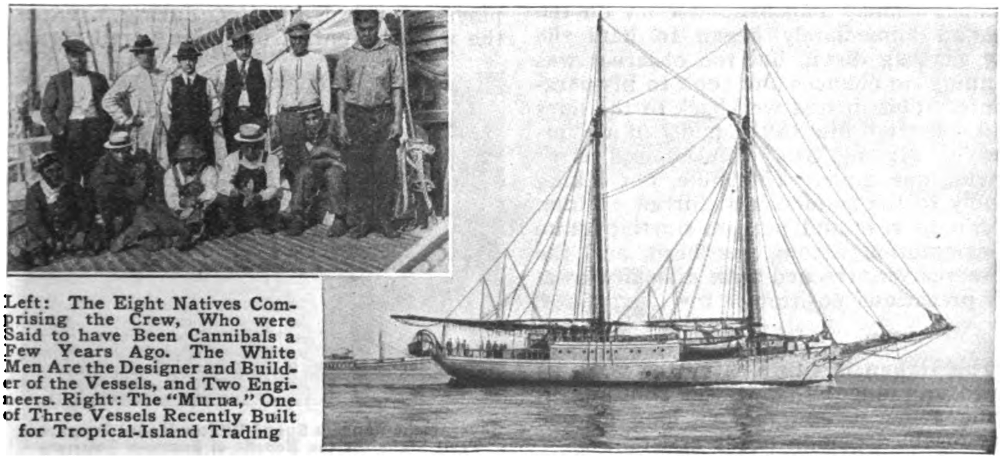
MOTORBOATS USED FOR COPRA TRADING UNUSUAL IN DESIGN

Designed especially for trading with the natives of tropical islands, three boats, recently completed in San Francisco, are particularly interesting. They are being used mainly in trading for copra—dried coconut meat from which coconut oil is derived. These vessels, which are combination sail and motor boats, are equipped with specially designed compartments, and, from the variety of articles carried in stock, resemble very much the old country store. This stock is made up of articles much sought after and highly prized by the natives, and, as the boats go from island to island, it is exchanged for copra, which is then taken to a central point and reshipped on ocean trading vessels. The crew brought to San Francisco to man these vessels was a curiosity. It was claimed by the captain in charge that they were cannibals several years ago, and they gave every indication of having been. They lived on meat, boiling large pieces which they tore up with their hands and devoured.

ALARM CLOCK TAKES NEW JOB AS PRIVATE SECRETARY

To keep us from forgetting time even for a minute, the makers of alarm clocks now have provided one that either emits a soft buzz to hint an appointment or another dose of medicine, or rings a loud gong to induce wakefulness, after the time-honored manner of such devices. The alarm may be set accurately to the minute because the indicating pointer is located on the bezel, which is turned to set it, making exact adjustment an easy matter. This quality of precision enables the clock to extend the household usefulness of its ancestors by working as a laboratory assistant or business reminder, in which its alarm might be used many times during the course of the day.

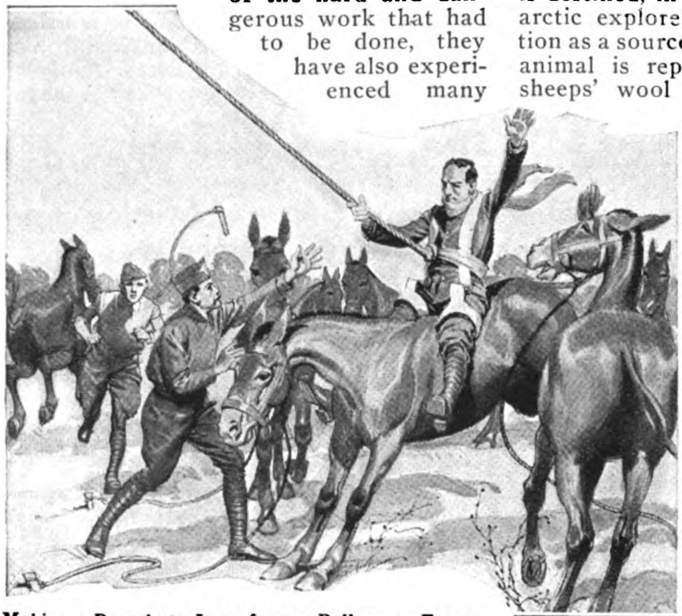




Left: The Eight Natives Comprising the Crew, Who were Said to have Been Cannibals a Few Years Ago. The White Men Are the Designer and Builder of the Vessels, and Two Engineers. Right: The "Murua," One of Three Vessels Recently Built for Tropical-Island Trading

OBSERVER LANDS ON MULE IN PARACHUTE JUMP

While men in the army air service, particularly those in the observation-balloon division, have all contributed their share of the hard and dangerous work that had to be done, they have also experienced many amusing incidents. Some of them might not have been so entertaining at the time, but later reflection would show the laughable aspects predominant. A good example is the experience, last fall, of an observer attached to the First Army. He had been up for several hours making notes on enemy infantry operations when he was suddenly attacked by a single-seat combat plane. The balloon crew on the ground immediately began to haul the big gas bag down, but the observer was running no chances and took to his parachute. This drifted well back of the lines and deposited him in the midst of a number of grazing army mules, and right astride one mule. The mule, not taking kindly to the sudden load forced on him. began to rear and plunge, starting quite a commotion among the herd, and the observer was rescued with difficulty from his precarious position.



Making a Parachute Leap from a Balloon to Escape an Attacking Airman, the Observer Alighted Astride a Balky Mule, Grazing with Others Well Back of the Lines

¶The Italian institution for the war-disabled announces that it will continue to bring relief to sufferers as long as one war-disabled person needs assistance.

GET WOOL, MILK, AND BEEF FROM NORTHERN MUSK OX

Of a size between the sheep and the ox, yielding the wool of one and the beef of the other, the musk ox of the North is destined, in the opinion of a celebrated arctic explorer, to attract greater attention as a source of supply. The fleece of the animal is reported by experts to equal sheeps' wool in quality, and a government department is now engaged in making careful studies of its comparative usefulness and economy. The animal's habitat on the frozen plains of Greenland and the barren reaches of America's northern latitudes makes it master of a range that cattle cannot penetrate. In its chosen country, therefore, it becomes the sole source of good beef and milk—a virtue perhaps more important to its human neighbors than the excellence of its wool, which is the chief commercial interest. Scientifically the musk ox is related neither to the sheep nor to the ox, but represents a distinct genus by itself. The fur is of a brownish color.

PREPARING FOR THE CAMPERS IN THE NATIONAL FORESTS

Always mindful of the public safety and convenience, the government employs its forest rangers, during part of the winter months, in making trail signs.

Government Rangers Spend Winter Hours Preparing Trail Signs for the Benefit of Summer Tourists

Carefully painted, stamped, and varnished, these boards are later crated and shipped to the rangers, who distribute them throughout the vast national forests. The signs prove themselves very useful, being placed every half mile along the trail, and at points where it crosses a road or stream.

AMERICAN BOMBING PLANE LANDS IN MUDDY FIELD

The seventh Handley Page bombing machine built in this country met with misfortune recently, at an Illinois aviation field when returning, with its six passengers, from a successful expedition to the near-by bombing ground. Alighting at high speed on a sticky, muddy field, the landing gear was retarded and the plane "stuck her nose in." No one was injured, although the twisted wreckage had to be cut away from the observer in the forward cockpit. Interest attaches to the machine as it belongs to the first American bombing squadron on this side of the Atlantic.

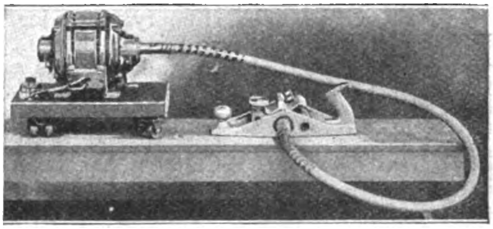
This American Handley Page Bombing Plane was Damaged in Landing in Sticky Mud at an Illinois Aviation Field

SNOW IN VACUUM BOTTLES FOR PEOPLE WHO NEVER SEE IT

Those of us who are used to the more or less rigorous winters of the North may think it strange that there are people in the United States who have never seen snow, except possibly on mountain tops at a distance. Conditions such as this exist in southern California in particular. Tourists and mountain-climbing parties have been in the habit of filling their vacuum bottles with snow for the edification of their friends in the lower valleys, where it is quite a novelty. In fact a bottle of snow was recently presented to a high-school physics class for the study of snow crystals.

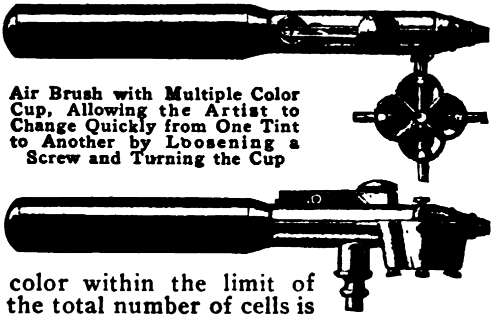
POWER PLANE LESSENS MANUAL LABOR FOR CARPENTER

As a labor-saving tool for the use of carpenters, an interesting type of electrically operated plane has been introduced of late. The device is equipped with a rotary knife connected through a flexible shaft with a motor. The latter is mounted on a base fitted with casters so that it may be readily moved from point to point. While the plane is said to be suitable for many uses, it is especially adapted for surfacing floors and accomplishing work of similar character.


Connected through a Flexible Shaft with a Caster-Mounted Motor, the Plane is Well Adapted for Surfacing Floors

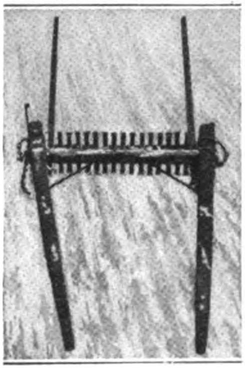
CHOICE OF AIR-BRUSH TINTS IN MULTIPLE COLOR CUP

In place of the color cup holding a single tint ordinarily used on an artist's air brush, a New York inventor has worked out a system of dividing the cup into a number of cells, each containing a different color. By loosening a screw and turning the cup, any desired cell may be brought into position for use, and any color within the limit of the total number of cells is made quickly available. Tightening the screw locks the color cup in position.


Air Brush with Multiple Color Cup, Allowing the Artist to Change Quickly from One Tint to Another by Loosening a Screw and Turning the Cup

¶In South Australia the returned soldier is advanced up to $3,000 for purchasing a home. The grant is not made to unmarried men, however, nor to those with a moderate income.

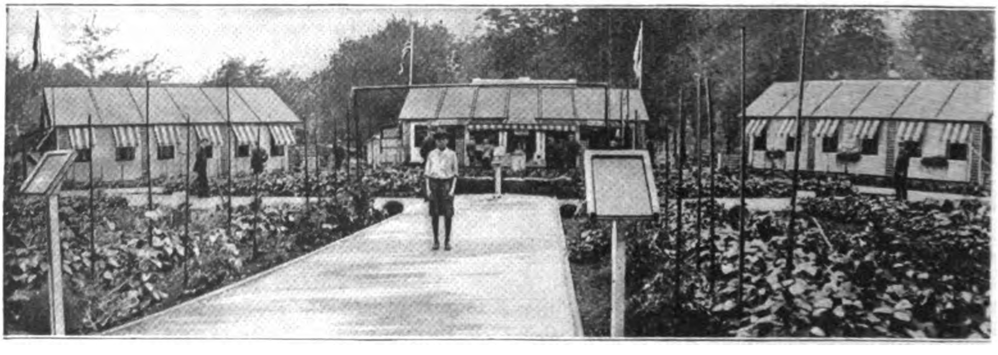
NOVEL DEVICE TO ROUGHEN SNOW-PACKED SIDEWALKS



Following a heavy snowstorm, pedestrian traffic will invariably pack the snow down; it becomes virtually as hard and slippery as ice, and is as difficult to walk on. As a means of combating this evil, the city of Ottawa, Canada, has been using a scratcher to roughen the surface of the ice-coated walks and thus make walking comparatively easy. This scratcher is about 3 ft. wide and consists of steel prongs bolted to a steel cross piece. To give greater scratching surface, the teeth on the prongs are split. This device is horse-drawn and may be operated by one man. Practically the only repair work necessary on it is the sharpening of the teeth.

BOSTON COMMON TO REMAIN A WAR GARDEN

Surprise was general when the authorities voted to devote staid old Boston Common to gardening purposes for the duration of the war. The experiment proved a success, however. The new common not only yielded valuable produce, and gave room for many wooden buildings housing various patriotic enterprises, but it furnished, also, a convincing demonstration, to the passer-by, of the worth of the back-yard garden. And Bostonians were recently startled still more by a decision to retain this innovation permanently. The common has appeared very attractive in its new garb, and it is popularly felt that the nation still needs every available acre of arable ground.



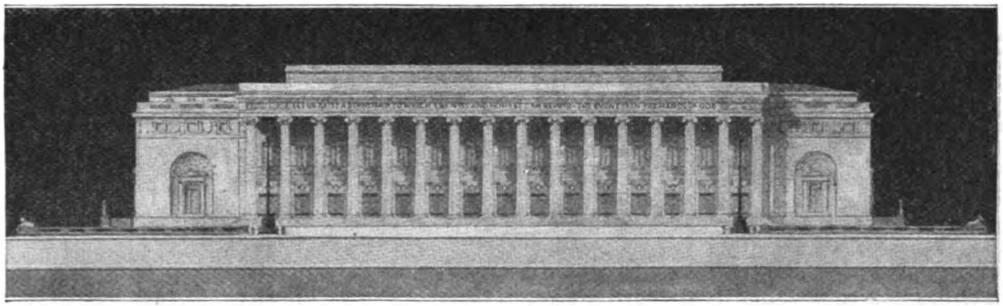
Attractive Temporary Buildings and Tidy Garden Plats Change Face of Venerable Common. This War Innovation Is to be Retained for the Needs of Peace

EUROPEAN AERIAL ROUTES IN ACTUAL OPERATION

Among the innumerable proposed aerial postal routes throughout the world it is interesting to find a few actually operating. Chief among these are Italian routes between the mainland and Sardinia, and between Rome and Turin; a Danish mail and passenger line from Copenhagen to Skagen; and an Austrian route from Vienna to Lemberg. Not yet operating, but soon to become a fact, is the very important line between Paris, Brussels, and London. An international postal line between Stavanger, Norway, and Aberdeen, Scotland, is also contemplated.

PAPER-YARN INDUSTRY GIVEN IMPETUS BY NEW DISCOVERY

Paper yarn has proved a satisfactory material for many purposes, and has even been used for clothing, especially in Germany, during the war. But such clothing attracted moisture and could not be made rainproof, mainly because the yarn used was "flat" or "half-flat." Recently, however, scientists, who have been experimenting with a view to correcting this fault, have found that by giving the paper strips a good twisting while they are being spun, the individual cellulose fibers become entwined; that is, the resulting yarn has gone through an actual spinning process. This would seem to open a wider field for the paper-yarn industry.



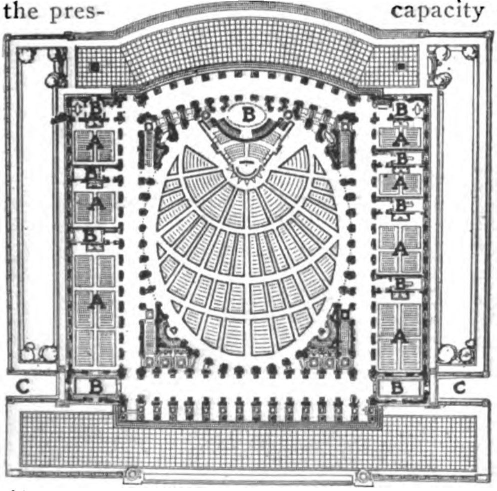
Front View of Proposed Memorial Hall to be Erected in Washington in Honor of Revolutionary and Present-Day War Heroes

NATIONAL MEMORIAL TO HEROES OF '17 AND '76

It now seems probable that one of the tangible fruits of the war, in the form of memorials, will be an immense convention hall to be located in the national capital, which strangely enough has no really suitable meeting place for large audiences. If the building, for which plans have been accepted and a splendid site secured through the coöperation of congress, is erected, it will be designated as a memorial both to the soldiers of '17 (and '18) and of '76. The reason for thus linking the heroes of the present with those of Colonial days is that George Washington himself is responsible for the idea of a memorial, having included in his will a bequest of $25,000 for the purpose. This was in the form of stock certificates, and was one of two gifts which congress gave him in view of the fact that he would accept no compensation of the usual sort for his services. In setting aside this gift in his will, Washington designated that it be used for the diffusion of knowledge.

While the original stock certificates have long since become of little value, the idea has never been lost sight of, and an organization was formed to raise money for the memorial. Our sharing in the great war interrupted the work of this society, but on the other hand the coming of peace has given it a new incentive, and so it is proposed to complete the fund (already $350,000 in cash, with many contingent promises in addition) and erect a great convention hall in honor of our boys in khaki and the revolutionary heroes. A splendid site has been granted by congress for the building—that now occupied by the old Pennsylvania Railway station.

It provides for a main auditorium with a floor space of 38,500 sq. ft., with a gallery of 10,000 sq. ft., the two having a seating capacity of 7,000, and so suitable for inaugural balls, public receptions, etc., as well as conventions. Grouped about the main auditorium are several smaller halls. The second floor is to have a banquet hall, with a capacity of 600 persons, and rooms designed to serve as permanent offices for patriotic societies.

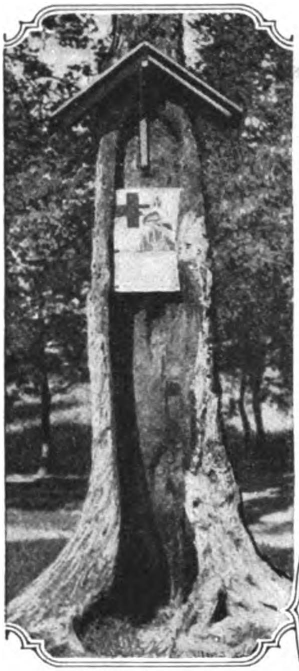


Above is Shown the Floor Plan of the Proposed Memorial Structure. The Center Oval Is the Auditorium Proper, Seating 7,000 Persons. "A" Indicates Assembly Rooms, "B" Reception Rooms, and "C" the Carriage Lanes

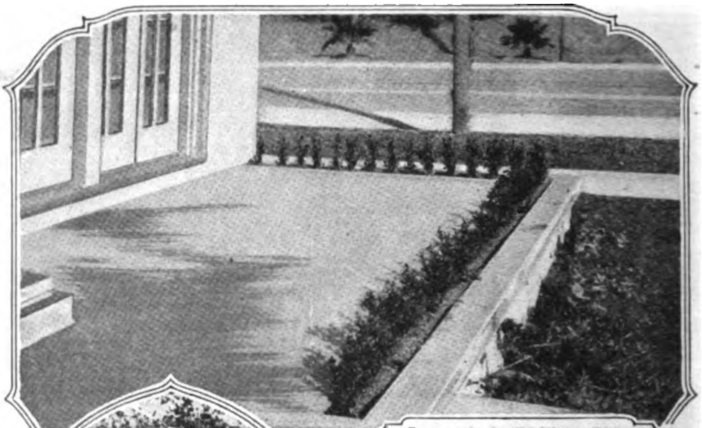
EFFICIENCY ON ITALIAN FARMS

The Italian ministry of agriculture is determined to make every acre in Italy do its bit. With this maximum production in view, an agricultural survey will be made to reveal every plot that is yielding less than it should. The backward farmer will then be given assistance in increasing the fertility of his land. In cases where the individual is unable, or unwilling, to coöperate, the government will insist on subletting or on a forced sale.

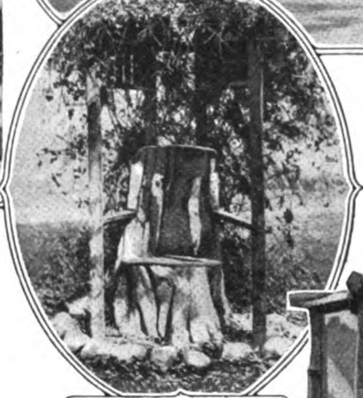
BITS OF OUTDOOR ART AMID HOME SURROUNDINGS



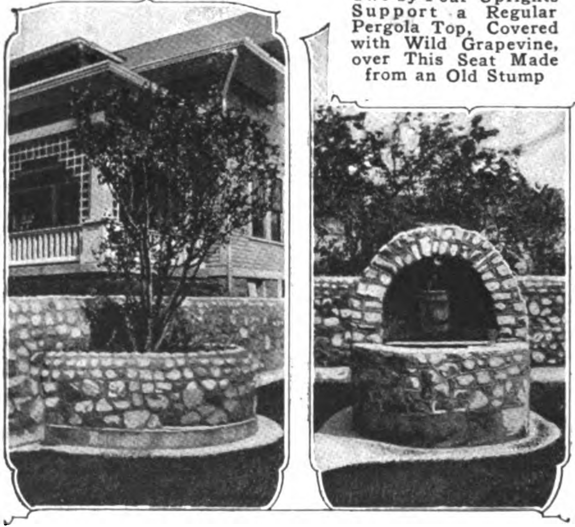
A Hollow Tree, with Its Dead Pulp Cleaned Out and a Little Gable Roof Erected over the Opening, Makes a Sheltered but Conspicuous Place to Hang Announcements



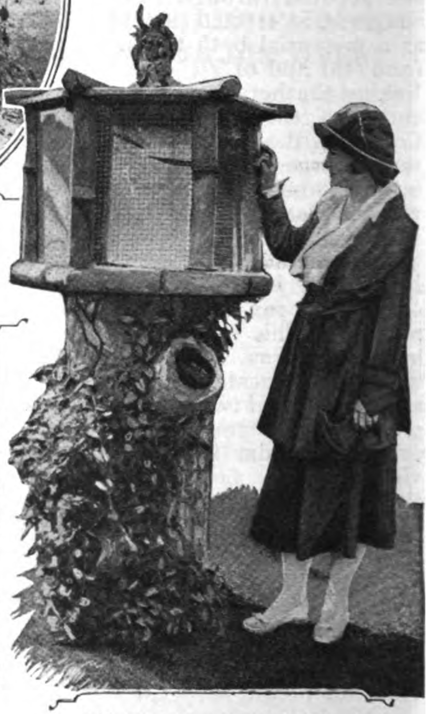
Instead of a Railing, This Concrete Porch on a California Home Has a Trough a Foot Deep and Eight Inches Wide Filled with Earth, in Which are Planted Evergreen Shrubs to Form a Hedge. The Trough Has Drain Openings, and the Porch Hedge Grows Nicely



Two-by-Four Uprights Support a Regular Pergola Top, Covered with Wild Grapevine, over This Seat Made from an Old Stump

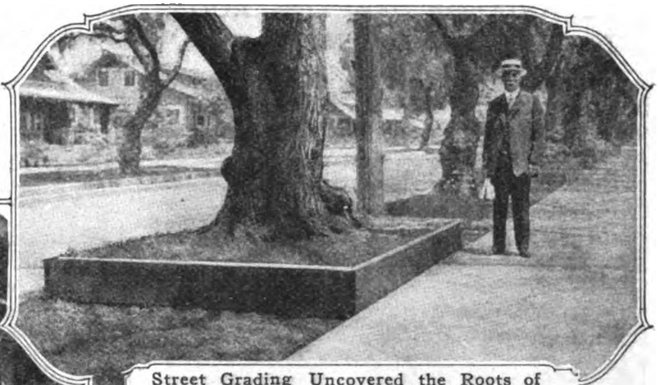


The Bush at the Left was Walled Up to Match the Well, Shown at the Right, and the Garden Wall, Beyond. This Old Well, Noted for Its Fine Water, was Protected and Greatly Improved in Appearance by the Cobblestone Curb and Arch Built About It. The Suspended Bucket Is Symbolical Only, as the Water is Piped to the House

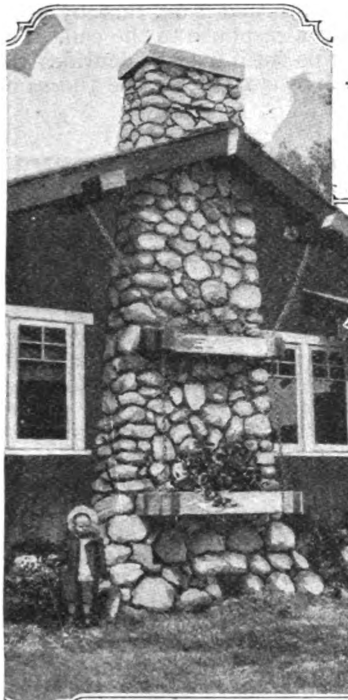


This Bird House on a California Lawn Is Safe at a Low Altitude Because It is Made of Concrete, as Is Also the Imitation Stump That Supports It. Three of Its Six Sides, Facing the Prevailing West Winds, Are of Plate Glass; the Rest Are Wire Netting

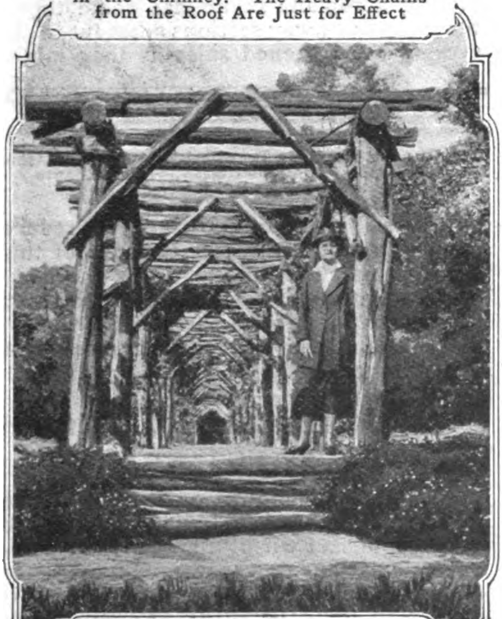
HELP GRATIFY THE BEAUTY URGE OF SPRINGTIME



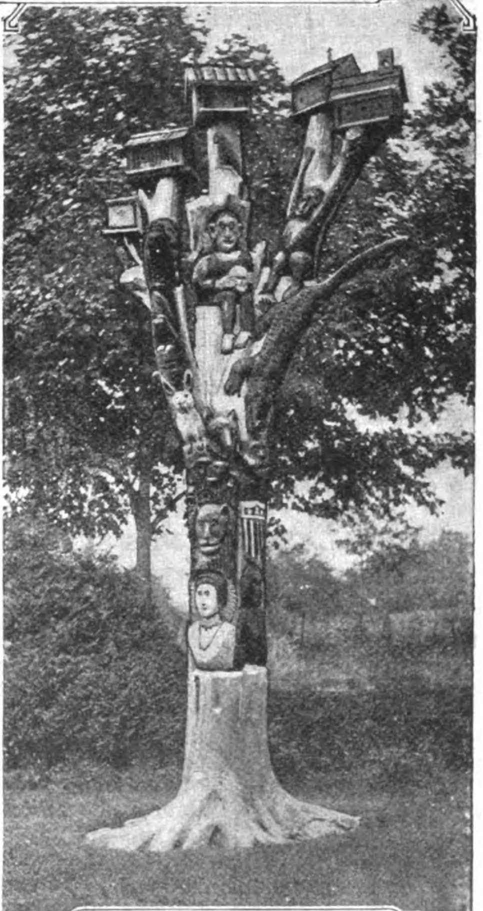
Street Grading Uncovered the Roots of These Fine Pepper Trees in a California Town. The City Forester Built Wooden Boxes About Them, Filled Them with Earth, and Painted the Boards Green



This is Called a Double Chimney Flower Box. The Two Boxes are Really Supported by Their End Beams, Imbedded in the Chimney. The Heavy Chains from the Roof Are Just for Effect



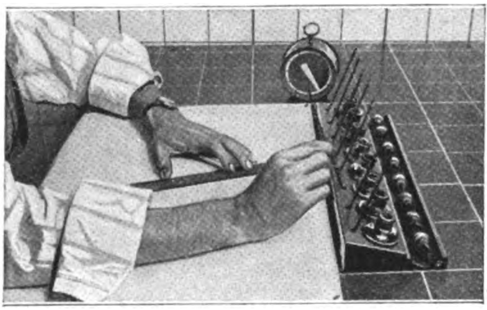
Eucalyptus Boughs Make Up This Rustic Arbor Entrance to a Southern California Estate. At the Base of Each Pillar, Climbing Roses have been Planted



A Civil War Veteran in a New York Village Carved This Totem Pole from an Old Tree. It Is 18 Feet High and Bears Relief Figures of 40 Animals, Birds, and Human Likenesses, All of Which are Painted in Various Tints. A Bird-House Community Occupies the Top

INKSTAND FOR DRAFTING ROOM PREVENTS COLOR MISTAKES

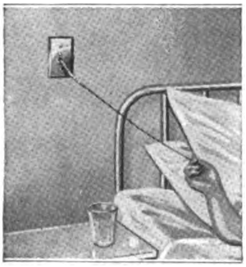
Draftsmen who work with varicolored inks, especially those troublesome fluids used in making hectograph drawings, are apt occasionally to replenish the pen from the wrong bottle, with temporarily disastrous results. An eastern engineer, whose office does much work of this kind, has devised an inkstand consisting of a wood strip with a row of holes in which the bottles fit snugly. A longitudinal channel behind the bottles holds the stoppers while the inks are in use. In front of each bottle is a small vertical hole in which a pen stands upright. With the pens in this "rest" position, the draftsman's fingers cannot reach any of the ink. Removing a pen for use, opens access to the bottle behind it, but to no other, and no error is possible.



The Pens Standing Upright in Front of the Bottles of Colored Inks Prevent the Draftsman from Taking the Wrong Color. He can Reach Only the Bottle from Before Which He has Removed the Pen. The Stoppers Rest in a Groove behind the Bottles

HOSPITAL CALL SENDS SIGNAL UNTIL NURSE ARRIVES

Nurse calls in hospitals are generally merely pendant push buttons, whose flexible suspension cords are quite apt to be frayed through by the petulant handling of patients. An improved switch for this purpose is set in the wall, with a standard outlet box, and has a chain pull with a long linen cord attached to it. Just above the chain opening is a push button, which is the only means of turning off the signal when the patient has turned it on, thereby practically forcing a response to the call. The position of this button also identifies the calling switch when several use the same signal.

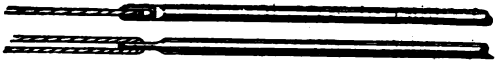


DANGEROUS ANTHRAX GERMS IN BRUSH BRISTLES

Anthrax, while essentially a disease of sheep and cattle, attacks man with great virulence when opportunity for infection offers. Several human cases have been definitely traced to the use of new shaving brushes in whose unsterilized animal-hair bristles lurked the germs of the malady. Occasional attacks are of record also among employes of brush factories. The danger, while not widespread, is sufficiently serious to have occasioned an order by the New York City health department that all dealers in bristles submit their stocks to it for sterilization. It is recommended that all new animal-hair shaving brushes be sterilized by boiling for two hours.

NEEDLE WITH CUT-IN HEAD FOR AEROPLANE FABRIC

Of late a needle particularly suited for sewing aeroplane fabric has come to attention. Cut-away sections adjacent to the eye—in the flattened sides as they might be termed in an ordinary needle—reduce the bulge of the thread. Because of this arrangement, the hole made by the body of the instrument is adequate for the easy passage of the looped thread. Obviously, the needle is adapted for other uses than the one mentioned.



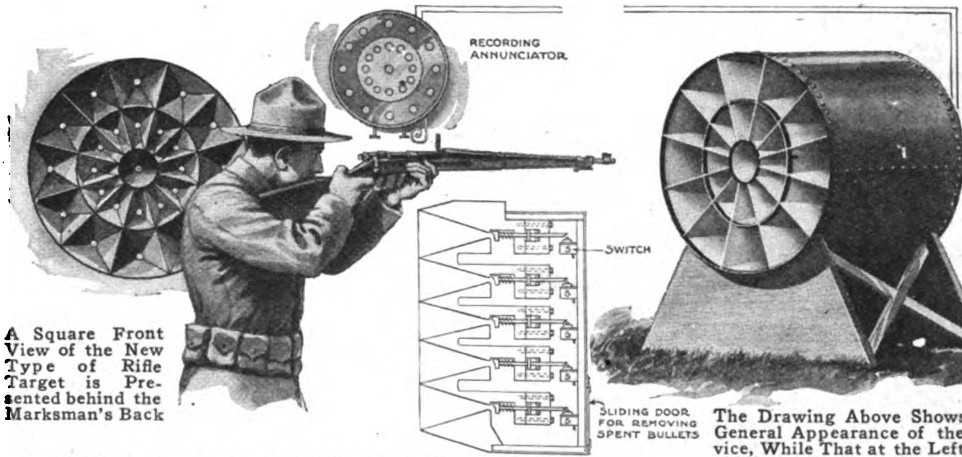
Showing the Needle in Two Positions That Illustrate Its Peculiar, Flattened Head, Which Adapts It for Tough Fabrics

WIRING FOR FARM LIGHTING GAUGED BY POCKET CHART

Wiring a farmhouse or country home for electric lights is simplified by the use of a new pocket wiring chart, giving, without calculation, the proper wire sizes for all loads and lengths of circuit. The chart applies to standard 110 to 125-volt installations, and supplements one formerly issued for 28 to 32 volts. A $3\frac{1}{2}$ by $5\frac{1}{2}$-in. card contains all the data necessary for the work.

CELLULAR TARGET FOR RIFLE SCORES AUTOMATICALLY

Of novel arrangement is a recently patented bullet-catching and self-scoring rifle target that seems to embody several points of interest. It is composed of a series of open-ended receiving pockets with converging walls. Registering with a small opening at the rear of each of these is a shock-absorbing plunger supplied with an angular face that causes a bullet, upon impact, to be deflected downwardly into a salvage compartment. Movement of the plunger actuates a switch connected in the annunciator circuit.



A Square Front View of the New Type of Rifle Target is Presented behind the Marksman's Back

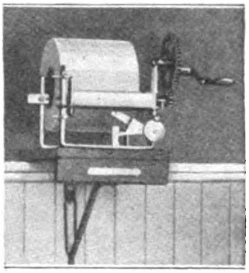
The Drawing Above Shows the General Appearance of the Device, While That at the Left Explains Its Interior Construction

The face of the indicator is divided into sections corresponding to those of the target. The cells of the latter may be of almost any desired number or arrangement, but in a 46-in. target designed for high-power rifles at 200-yd. range, they are grouped around the eight-inch bull's-eye in two concentric rows of 12 pockets each.

ITALY BEARS BRUNT OF FUEL SHORTAGE AMONG ALLIES

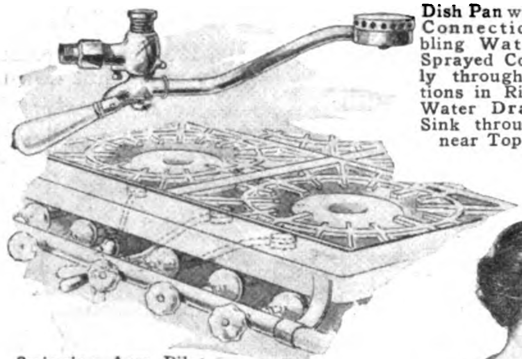
With her population as a whole going without coal for heating for many months of the war period, and a large part even being without gas for cooking, Italy was, without doubt, the worst sufferer from the coal famine of the last two years. Having a normal consumption of 10,000,000 tons annually, the country has been receiving only 7,000,000 tons, and the population was forced to use lignite, which is Italy's only domestic fuel. This commodity, which at best is very little superior to peat, has been produced on an average of 700,000 tons yearly in prewar periods, but the coal situation forced this production up 2,500,000 tons in 1918. To make matters worse, 120 out of a total of 128 gas plants in Italy were shut down in the early part of 1917, leaving only those in the larger cities in operation, and consumers were allowed the use of gas for cooking purposes during an aggregate of only four hours a day. Representatives of the Italian government urge an annual supply of 12,000,000 tons to avoid possible serious disturbances.

PAPER-ROLLING AND CUTTING DEVICE FOR BARBER SHOPS



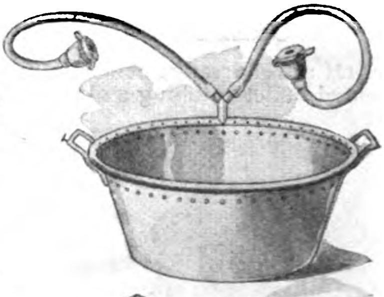
As a means of helping reduce the high cost of shaving, a Buffalo, N. Y., man has recently invented a machine for rolling and cutting shaving paper. These rolls go just underneath the headrest of the barber chair, a piece of paper being pulled out and torn off for each new customer. Heretofore they have been purchased from supply houses all rolled and ready to insert, and have been more or less costly. By using this new device, however, the barber has only to purchase a large supply roll, thus saving some money. The device automatically catches the paper, winds it, and cuts it off when the roll has reached the proper size. Since a roll can be wound in about 15 seconds, little time is lost.

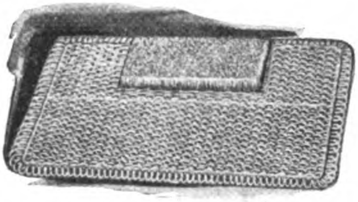
SOME NOVEL AND LITTLE-KNOWN ACCESSORIES



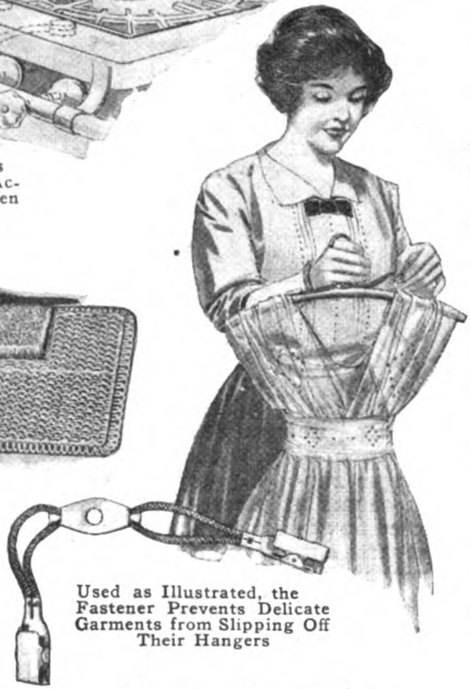
Swinging-Arm Pilot Lighter for the Gas Range, a Convenient Accessory in the Kitchen

Dish Pan with Faucet Connections Enabling Water to be Sprayed Continuously through Perforations in Rim: Dirty Water Drains into Sink through Holes near Top of Pan

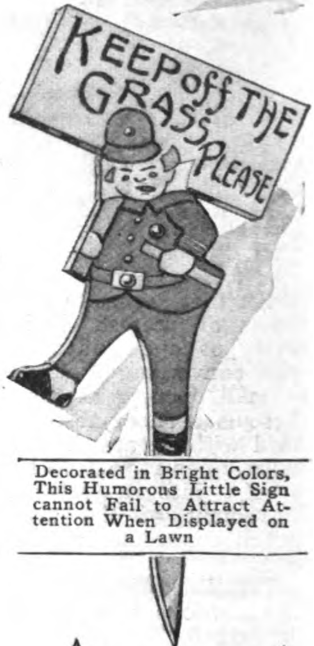




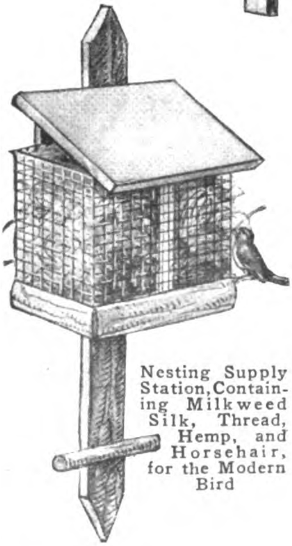
Combination Metal and Fiber Mat for the Porch Floor: The Inset is Neatly Fitted and Securely Held in Place



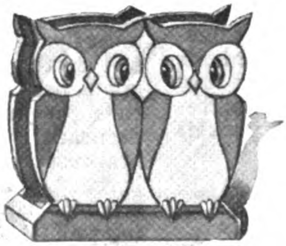
Used as Illustrated, the Fastener Prevents Delicate Garments from Slipping Off Their Hangers


KEEP off THE GRASS PLEASE

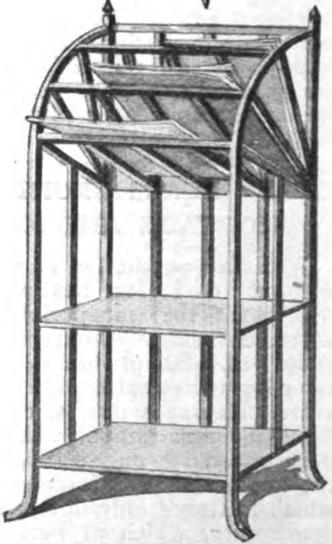
Decorated in Bright Colors, This Humorous Little Sign cannot Fail to Attract Attention When Displayed on a Lawn



Nesting Supply Station, Containing Milkweed Silk, Thread, Hemp, and Horsehair, for the Modern Bird

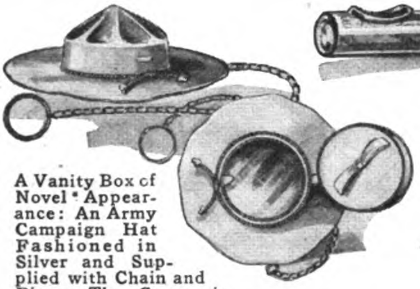


Wise Old Owls, Perhaps Night Owls, Back to Back and in Colors Unknown to Nature, Form an Attractive Holder for Playing Cards



For Library or Office, an Artistic and Substantially Built Magazine Stand of Solid Mahogany

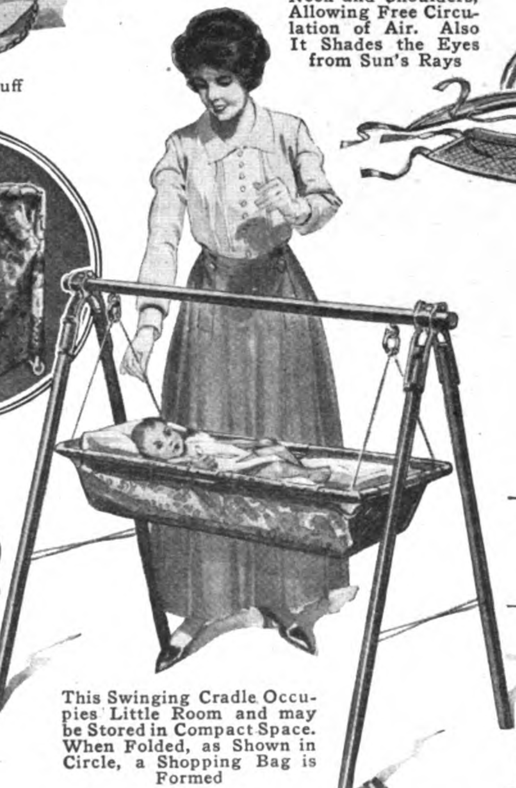
INTENDED FOR THE HOME AND ITS MEMBERS



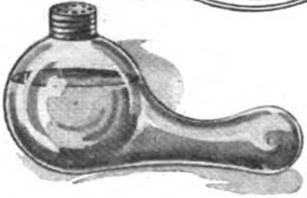
A Vanity Box of Novel Appearance: An Army Campaign Hat Fashioned in Silver and Supplied with Chain and Ring. The Crown is Hinged and Holds a Powder Puff

For the Smoker: A Neat Device That Makes a Humidor of an Ordinary Cigar Box and Keeps Stock Fresh

This Drying Frame Holds the Hair from Neck and Shoulders, Allowing Free Circulation of Air. Also It Shades the Eyes from Sun's Rays



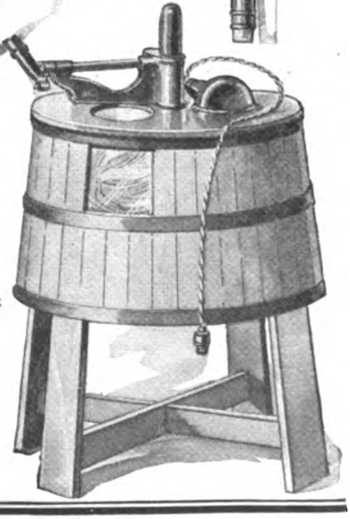
This Swinging Cradle Occupies Little Room and may be Stored in Compact Space. When Folded, as Shown in Circle, a Shopping Bag is Formed



For Use in the Household Laundry: A Clothes Sprinkler, Made of Glass, That Saves Time and Labor

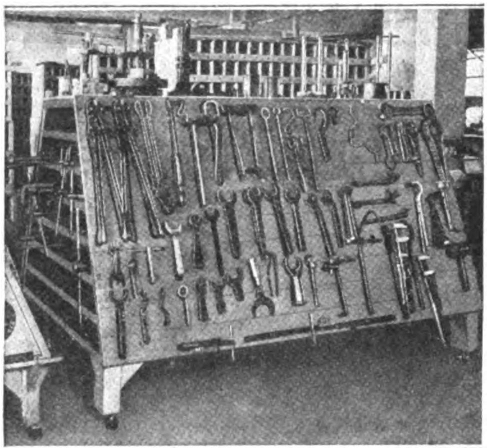
To Protect Sharp Pencil Points: A Wooden Cap, Decorated in Colors

A Dainty Laundry Bag for the Nursery: The Bag is Made of Colored Poplin and Buttons to the Wooden Frame, Which is Tastefully Decorated



This Washing Machine is Fitted with Glazed Ports and an Electric Lamp, So That the Interior may be Viewed without Raising the Cover

HANDY TOOL RACKS HAVE HELPFUL INDEX MARKS



Tool Racks in the Shop of an Automobile Factory on Which the Place of Each Tool is Designated by a Number and the Outline of the Tool in Red: Extra-Long Tools are Kept on the Shelves of This A-Shaped Rack

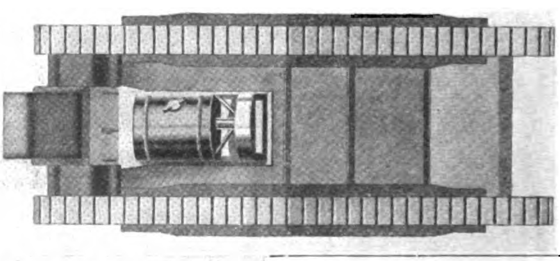
Wooden tool racks of special design, mounted on casters, in the shops of an automobile factory have proven timesavers for the workmen. One of the racks is a truncated pyramid, and the other is A-shaped in its cross section. On the slanting sides of each are numbered hooks for the tools, which are numbered correspondingly. That there may be no mistake in replacing a tool, the outline of each is painted in red in its proper place on the side of the rack.

DIRECTION AND VELOCITY OF WIND DETERMINED BY SOUND

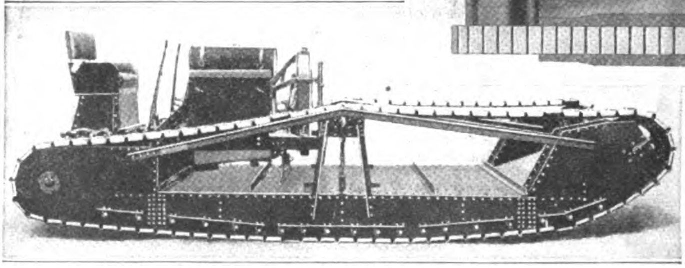
Sound ranging, invented for the use of artillery, is expected to become valuable also in the study of meteorological problems. Small balloons, filled with hydrogen, and carrying small shells that burst at regular intervals, are allowed to rise freely and be carried by the various currents of the atmosphere. Special apparatus registers the shell explosions, and these enable the position of the balloon to be accurately determined. From these points, when plotted, the trajectory, or course, of the balloon can easily be traced. Using the sum of the projections, on a horizontal plane, of the positions at which the explosions took place, and the knowledge of the time intervals between these explosions, the velocity and mean direction of the wind can be determined between certain altitudes. The explosions can be heard at distances up to about nine miles, and the small balloons can be used in winds of high velocity, when captive balloons and kites would be unmanageable.

ENGLISH ARTILLERY TRACTOR HAS CARGO SPACE

English military tractors have no springs between frame and track rollers, in which respect they differ from French types with an individual spring for each roller or truck, and American methods of carrying the rollers on a spring-mounted truck. One model of English tractor, brought out by the war, has 19 truck rollers on each side of the frame, or "hull" as the British call it. The steel-plate hull of this machine, which is used for both towing and cargo carrying, has a large load space between its track treads, ahead of the engine. The track rollers are rigidly supported by the vertical steel side plates that inclose the lower portion of the frame.



This Plan View Indicates the Area of the Tractor's Cargo-Carrying Space, All the Forward Half of the Deck



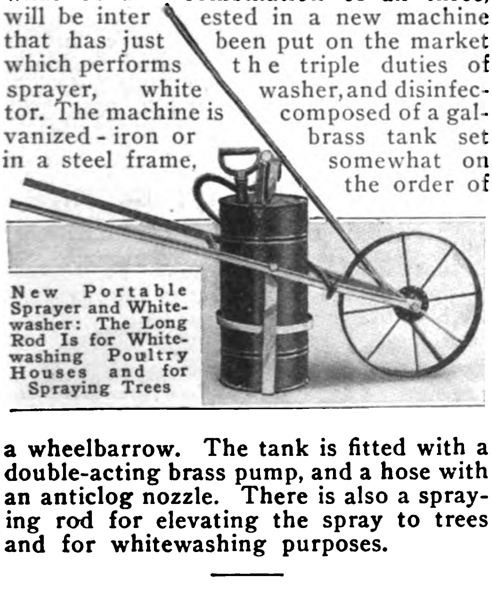
Large Cargo Space Is the Feature of This English Military Tractor. The Rollers, 19 on Each Side, are Rigidly Mounted without Springs

TO USE AVIATION FIELDS AS FARM-INSTRUCTION CAMPS

Just when the various governments are beginning to discuss ways and means of utilizing the vast army training camps that have been established, Canada comes forward with a solution of one part of the problem that should prove highly effective. In the Dominion, aviation fields are being converted into agricultural schools. It would appear that they are ideal for the purpose. They can accommodate close to a thousand men; mess halls and living quarters, shops for repairing tractors and implements are all there, ready for use, and with few and easily made changes in the hangars they will provide housing for live stock. Ample grounds are also available, so that a great variety of crops may be studied.

NEW PORTABLE SPRAYER WILL BE BIG AID TO FARMER

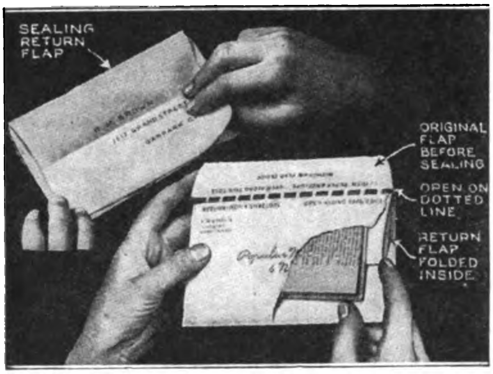
The gardener, the poultry man, the nurseryman, or the farmer, who is somewhat of a combination of all three, will be interested in a new machine that has just been put on the market which performs the triple duties of sprayer, whitewasher, and disinfector. The machine is composed of a galvanized-iron or brass tank set in a steel frame, somewhat on the order of a wheelbarrow. The tank is fitted with a double-acting brass pump, and a hose with an anticlog nozzle. There is also a spraying rod for elevating the spray to trees and for whitewashing purposes.



New Portable Sprayer and Whitewasher: The Long Rod Is for Whitewashing Poultry Houses and for Spraying Trees

MAILING AND REPLY ENVELOPE MADE IN ONE PIECE

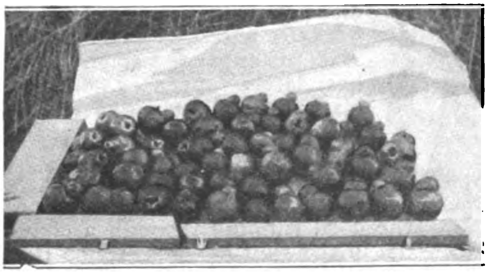
The common return envelope has proven so desirable a spur to business that methods for its economical production are interesting. A California inventor provides an envelope with both open edges terminating in flaps. A short flap on the front seals the mailing envelope, and a printed line requests the recipient to open it on that side. When this is done the second flap is revealed, tucked inside, and may be withdrawn and pasted outside, over the original address. This second flap has the return address printed on it, and needs only a stamp to carry the contents back to the sender. The envelope is made in both regular and "window" styles.



When This Envelope is Slit Open along the Line Indicated, the Printed Auxiliary Flap Inside may be Pulled Out and Pasted over the Old Address, Making It a Return Envelope

DOUBLE APPLES NEW ADDITION TO NATURE'S MANY FREAKS

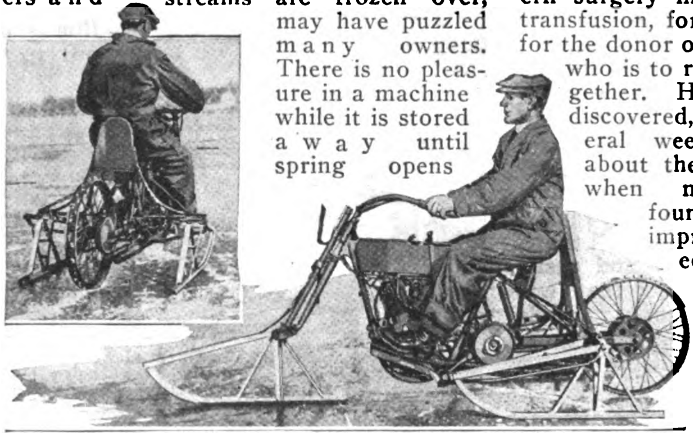
Good old Dame Nature has given us many wonderful things, and also many freaks. While in a good many cases she has had the help of men who have made a study of special phases of plant life, she can take full credit for a large majority of them. Now, up among the apple orchards of the great Northwest, she has added new laurels to her already long list by producing some really remarkable double apples: "Siamese-twin" apples, if you please. In one shipment of 900 boxes there was more than a boxful of these curious products of fruitland. The fruit will be exhibited merely as a curiosity.



Double Apples Picked at Yakima, Washington: In Some Cases the Second Apple Is Not Very Pronounced, While in Others It is Full-Grown

MOTORCYCLE SLED ADDS TO JOY OF WINTER SPORTS

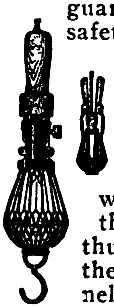
Just what to do with a motorcycle when the snow covers the ground, and the rivers and streams are frozen over, may have puzzled many owners. There is no pleasure in a machine while it is stored away until spring opens up the roads to travel. Many contrivances have been devised for converting the machine for winter use, and here is a new solution of the problem, offered by an Albert Lea, Minn., man. He has equipped his car with runners and a specially built rear wheel fitted with protruding points which catch in the ice, or roadway, and transmit the driving power. He is able to travel on either ice or snow-covered roads, and he claims, with the use of this device, he can attain even greater speed on the ice than with a regular motorcycle on land.



Two Views of the Motorcycle Sled Designed to Permit the Use of a Machine the Year Around: The Builder Claims Even Greater Speed Is Possible on the Ice Than on Regular Roads with the Ordinary Motorcycle

SPLIT HANDLE ON LAMP GUARD MAKES WIRING EASY

When using an incandescent lamp on a long cord as a portable light, a lamp guard with a handle adds to both safety and convenience. The handle, however, is ordinarily hard to wire. A lamp guard made of expanded steel, which has lately appeared on the market, has its wooden handle split lengthwise so that the whole guard opens on a hinge at the end of the steel net. It is thus easily clasped about the lamp, the cord running through a channel in the split handle. When it is closed and locked the lamp is protected against breakage and theft, yet may be quickly removed when desired.

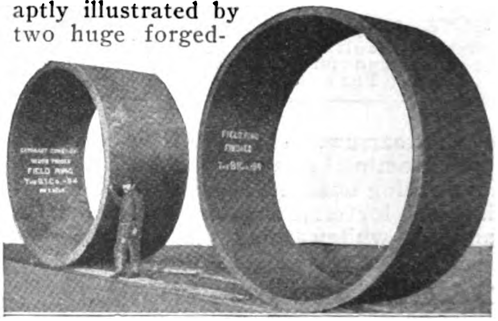


"CANNED" BLOOD IS EMPLOYED IN TRANSFUSION OPERATIONS

Credit is due to the exigencies of war for another important triumph of modern surgery in perfecting operations of transfusion, for it is no longer necessary for the donor of the blood and the patient who is to receive it to be brought together. Human blood, it has been discovered, may be preserved for several weeks—a month represents about the limit of time—and used when needed. War surgeons found, for instance, that the improvement of patients was equally marked when they were supplied with blood that had been kept three weeks or more, as when "fresh" blood was used. The importance of the latest technical change in this operation is almost obvious. It lies chiefly in the advantage of having a stock of blood at hand at all times for the emergencies that constantly arise. In other words, in critical cases it enables transfusions to be made without delay. As a side light, in the future there undoubtedly will be a permanent market for human blood, rather than the unstable one that has obtained heretofore.

RINGS FOR TURBINE ENGINES FORGED FROM SOLID STEEL

Just what wonders may be accomplished by modern industrial methods is aptly illustrated by two huge forged-steel rings recently completed. These rings were forged and pressed from solid-steel ingots and are to form the fields of turbine generators for a Niagara Falls



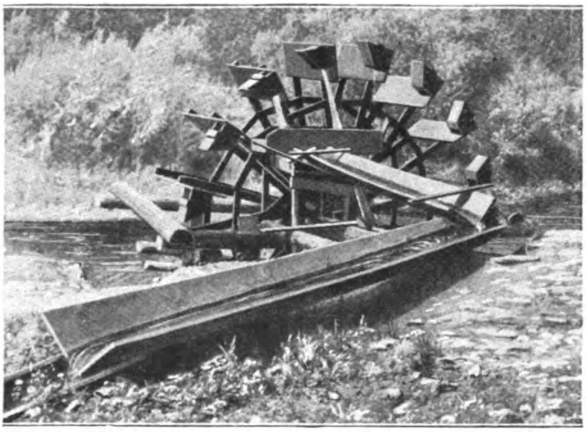
Two Steel Rings Recently Completed to Form the Field of Turbine Generators: The Rings are Forged from Solid-Steel Ingots and Are in One Piece. That on the Left Is the Rough Forging, While the Other Is the Finished Article, after being Machined hydroelectric plant. In forging the rings, the ingots are first heated almost to a dripping heat in soaking pits, or furnaces, and are then "kneaded" into shape and made hollow by forging presses and hammers. This process is continued until the rings reach the desired size, when they are machine-finished. Forging of field rings is not an easy feat, for the finished product must be as nearly free from imperfections as it is possible to have it.

HIGH-SCHOOL BOYS HELP PLOW VAST TRACT IN QUICK TIME

One of the biggest undertakings on record in the way of speedily preparing untilled soil for cultivation, was begun last spring in Montana, and is still in progress. The tracts being broken, aggregating 200,000 acres, are lands belonging to the Indians and have been leased through the government, with a view to adding to the food supply. In the crew of workers stationed near old Fort Custer, on the Crow Reservation, were a score of Minneapolis high-school boys, who with others had use of nearly 50 tractors. In one day 14 of these machines, pulling plows that turned a total of 100 furrows at once, plowed 365 acres, which, it is claimed, is a world's record. Two of the boys, one on a tractor and one attending to three seeders, seeded 189 acres in one day.

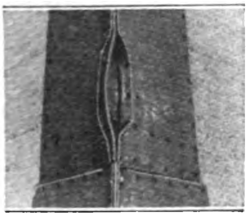
INDIAN'S WHEEL LIFTS WATER FOR FIELDS WITHOUT COST

The resourcefulness and mechanical ability of a full-blooded Indian in the state of Washington is illustrated by a large water wheel which he constructed for irrigation purposes. It is supported in a narrow stream by a framework of logs and is composed of 16 broad paddles, each having attached to one end a wooden box which fills with water as it descends into the stream and discharges into a trough when it nears the top of its circuit. No power other than that of the current is required to lift the water the distance of eight feet.



A Water Wheel Devised by a Full-Blooded Indian in the State of Washington, Which Lifts Water Eight Feet and Discharges It into a Trough, Whence It Flows into Irrigation Ditches

STEEL PLATE ON BRIDGE PIER BUCKLED BY ICE GORGE

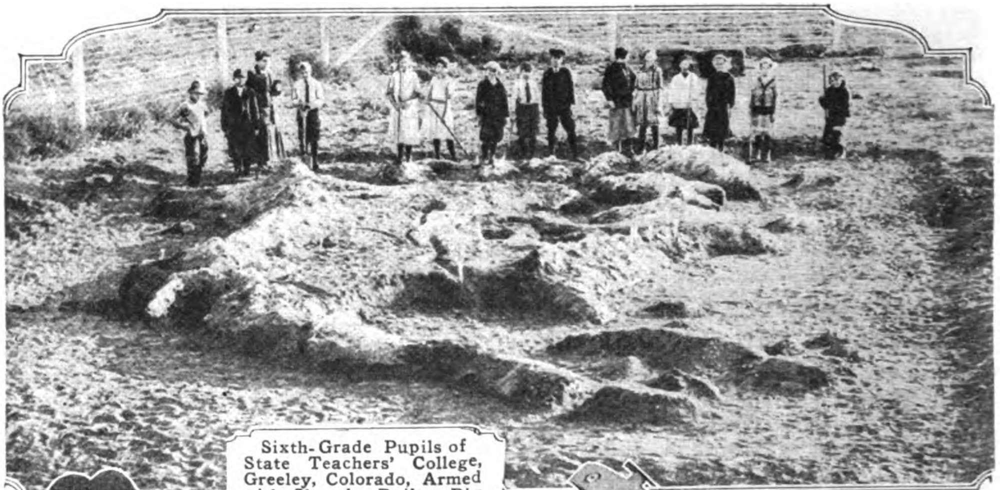


How tremendous is the pressure exerted by the breaking up of ice in a heavy current was demonstrated at Battleford, Sask., Canada, where a railway bridge crosses the Battle River on concrete piers. Steel plate, ½ in. thick, surrounds the piers, its edges bolted together through steel ribs 1 in. thick. When the ice had gone out, this inch-thick corner was found to be twisted and buckled quite out of shape, in spite of the almost negligible purchase offered by the tightly fitted joint.

NEW HARBOR TO FACILITATE RAW-RUBBER IMPORTATIONS

A large part of the raw rubber used in the United States is imported from the island of Sumatra, belonging to the Dutch East Indies. Lack of shipping facilities have, heretofore, greatly hindered rubber importers, particularly on the east coast near Medan, where several large rubber plantations are situated. The raw product has had to be loaded on lighters and then transferred to ocean vessels at sea, requiring double handling. In recognition of this, the authorities have made plans to dredge a harbor at Belawan, Medan's seaport, deep enough to accommodate the largest vessels. This harbor is to cost approximately $4,000,000 and will take about three years to complete. Once in service, it will greatly expedite overseas shipments of crude material.

THE CHILDREN, IN STUDY, WORK, AND PLAY



Sixth-Grade Pupils of State Teachers' College, Greeley, Colorado, Armed with Shovels, Built a Big Contour Map of North America on the School Campus as a Permanent Patriotic Reminder and an Impressive Geography Lesson

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Toy Airplanes Interest the Little Fellow at the Left More Than Bow and Arrow or Sling Shot, Which They Resemble Only in Their Method of Propulsion

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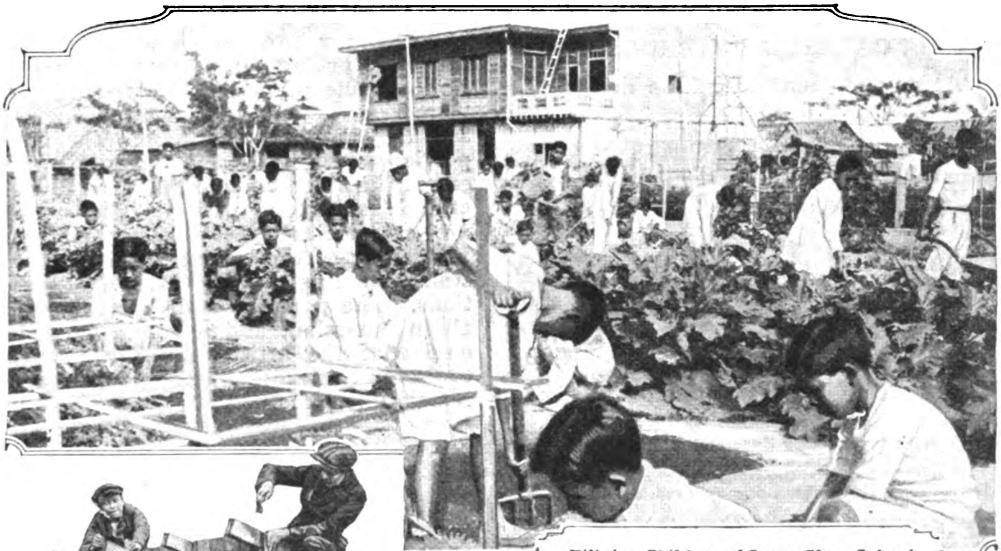
This Six-Months Old Baby was Picked Up on a French Battle Field at the Age of Nine Days, and Is the Only Foundling So Far Permitted to Leave France

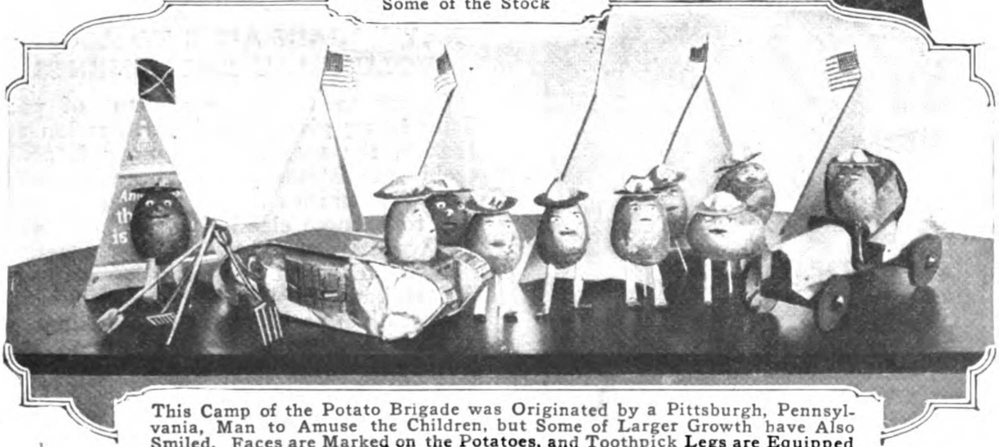
A Boy in Pasadena, California, Has a Treasure Island of His Own, with a Playhouse Cabin on It, Reached by Stepping Stones from the Mainland of His Father's Lawn. There Is a Spray Pipe So He Can Make It Rain When He Wants to

MAINTAIN THEIR PATRIOTISM IN PEACE TIME



Filipino Children of Santa Clara School, Santa Cruz, Manila, are Still Making Liberty Gardens with Enthusiasm and Success, and the Prospective Crop Promises to Exceed Last Year's

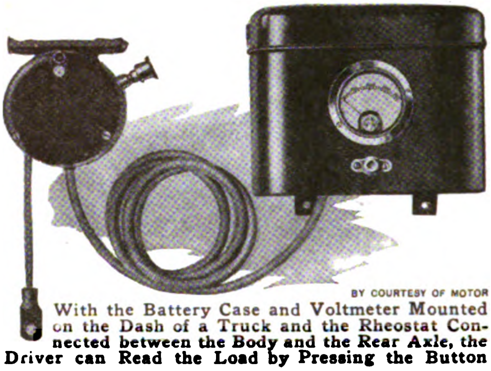
Poultry Raising Is a Regular Study Now in the Public Schools of Cincinnati, Ohio, the Board of Education Prescribing Half-Day Classes. The Pupils Build Their Own Hen Houses, as Seen at the Left; the Boy at the Right is Displaying Some of the Stock



This Camp of the Potato Brigade was Originated by a Pittsburgh, Pennsylvania, Man to Amuse the Children, but Some of Larger Growth have Also Smiled. Faces are Marked on the Potatoes, and Toothpick Legs are Equipped with Paper Leggings

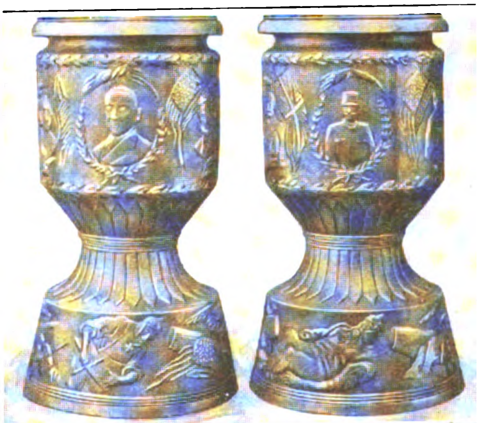
METER ON DASH TELLS LOAD CARRIED BY TRUCK

At any moment when the driver of a motor truck wants to know the weight of the vehicle's load in 50 or 100-lb. units, he can tell at a glance, by pressing a button and looking at an instrument on the dash. The visible part of the device is a pressed-steel case containing dry cells and a voltmeter, with a push button just below the dial. Mounted under the truck floor, over the rear axle, is an inclosed rotary rheostat. A cable running from it and attached to the rear axle varies the position of the rheostat and its resistance as the truck springs are deflected by the load, and the result registers on the voltmeter in front.


BY COURTESY OF MOTOR
With the Battery Case and Voltmeter Mounted on the Dash of a Truck and the Rheostat Connected between the Body and the Rear Axle, the Driver can Read the Load by Pressing the Button

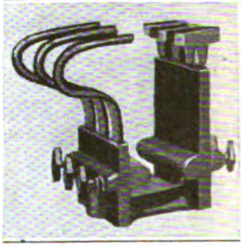
ITALIAN ARTIST DESIGNS UNIQUE WAR SOUVENIR

Souvenirs of the great world war have been extremely plentiful, and of all kinds and descriptions, but it has remained for an Italian artist to produce a really unique design. Working at odd times over a period of nine months, he has hand-hammered out of copper a stand 30 in. high and 15½ in. across the base. The upper portion is decorated by portraits of rulers of the allied countries and of Lincoln and Washington. Around the bottom are caricatures of the kaiser and von Hindenburg, the allied flags and the American Eagle being used as decorations. The portraits and decorations are all in bas-relief, and when it is considered that the artist fashioned his own tools for this work, the stand is really a remarkable piece of art.


BY COURTESY OF THE JEWELERS' CIRCULAR
Two Views of a Stand Hand-Hammered from Copper by an Italian Artist: The Portraits and Caricatures Thereon Are Exceptionally Good Likenesses

GLASS-BLOWER FIRES FOR BENCH WORK

Such comparatively delicate work as finishing incandescent lamp bulbs and sealing in wires has led to considerable improvement in the fires used by glass blowers. One instrument provided for this class of work has slotted burners accurately machined from solid rolled bars, valves held in position by collar nuts which cannot be removed, and a machine-finished iron base which clamps solidly to a plate on the workbench. All rubber connections are kept below the bench, and the smooth-drilled passages are readily cleaned.



NAVY AGAIN ABLE TO ACCEPT VOLUNTARY ENLISTMENTS

Owing to the large amount of publicity being given the demobilization activities, the fact that the navy is again seeking enlistments and is offering notable opportunities to young men who desire to become electricians or machinists by trade, has not become generally known. Enlisted men who have a theoretical knowledge and have had some practical experience in these lines of work, are given an opportunity to take a complete course in the Machinist School and the Electrical School, where they can obtain a much higher degree of knowledge than would be possible from general civilian experience.

Tools for the Victory Garden

By R. J. SLOANE

WHILE it is entirely possible to make a good garden with tools of the types that have been in use for generations, there is no good reason why the modern back-yard farmer should not take advantage of the improvements suggested by past experience, and provide himself with tools that do the work more quickly, more easily, and with more satisfactory results.

Hill Marker

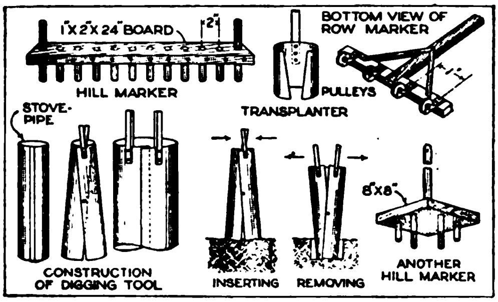
The planting of seed is no longer a matter of guesswork. It is well known now that the spacing of plants in the row has a great deal to do with the yield, both in quality and in quantity. The hill markers illustrated not only make the spacing of the plants a simple matter, but they compact the seed bed slightly, which is very desirable according to modern scientific theory. The hill marker is merely a light wooden strip fitted with wooden pegs of the proper length, and spaced the proper distance apart to suit the requirements of the particular variety of seed being planted. The marker is pressed into the soft earth along the guide line, rocked slightly, then lifted up, and the operation repeated as many times as necessary. The result is a series of holes spaced to allow the plants the correct amount of growing room, with the proper depth, and compacted sufficiently to insure quick germination and rapid growth. The seeds are easy to plant with such preparation, easy to cover with dirt, and will grow uniformly if the seed is good.

Row Marker

The row marker shown in the sketch is very handy to use in connection with the hill markers. The first row must, of course, be laid off with line and stake, but the row marker is used to lay off the rest of the garden, and the result is that all the rows are parallel and evenly spaced, making not only a good-looking garden, but one that is easy to cultivate. The marker is merely a frame which supports four clothesline pulleys. These are spaced 1 ft. apart, the common distances between rows being 1, 2, and 3 ft. When the marker is drawn across the soft earth, it leaves four depressions which are easily followed with the hill marker, or with the digger and transplanter to be described.

Transplanter

The majority of the better gardeners of today sow their seed in seed flats indoors, long before the weather is fit for gardening outside. When the seedlings are about 3 in. high, or have three leaves on them, they are moved to a cold frame outdoors. Then, when the weather is good enough, they are transplanted to the garden. These different operations are not hard to carry out if the proper implements for the work are at hand. The simple transplanter and the digger shown in the drawing were designed for two different classes of work.



Practical Tools for Marking the Hills and Rows, Digging Holes for the Plants, and Transplanting Them Are within the Reach of Every Gardener

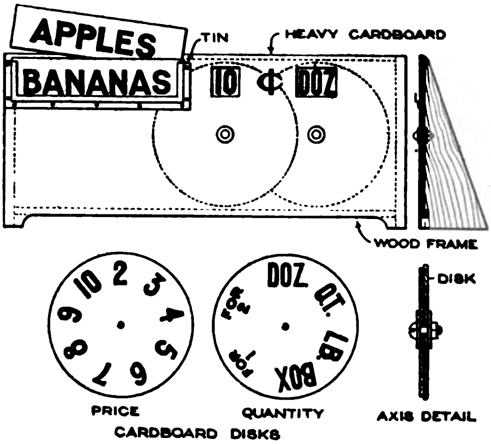
To remove plants for the second transplanting, a tool made from a tin can and a stick proves of much service. It will make the new hole in the soft, moist earth, will remove the plant without disturbing the earth around its roots, and will place it in its new location, the whole operation consuming only a few seconds. After the top end and sides have been cut out of the can, the edges should be trued, then filed sharp and smooth. A section is cut from one side, leaving an opening which is larger at the top than at the bottom. On the opposite side of the can a stick is nailed, with the end cut tapering so as to offer as little resistance as possible when the tool is pushed into the earth. To use, the transplanter is placed around the plant and pressed down into the soil, cutting all straggling roots. It is then easily removed, without loosening the dirt around the roots, and is placed gently in the hole prepared for it.

When the transplanter is pushed into the soil, the lower edges are forced together so that the tool cuts a conical hole. In removing the transplanter, care is taken to hold it tightly against one side of the hole, so that it will retain the dirt. When clear of the hole, the handle is lowered until the tool is horizontal. It can then be lifted without the dirt escaping.

Digging Tool

Although similar to the transplanter described above, the digging tool is even handier. A 1-ft. length of 4-in. stovepipe, or galvanized pipe, is opened at the seam, and the edges hammered smooth. A hole is drilled in each edge, near the center of the pipe, and a small stove bolt is used to hold the edges together. It must fit loosely enough so that when the top edges of the pipe are forced apart the lower edges will close together, the pipe edges forming a sort of scissors, with the bolt as a pivot. Two 6-in. strap-iron handles, riveted to the upper edges of the pipe, will complete the tool. The main uses of this tool are digging plants from the hotbed, and digging holes to set them in. While the transplanter described above is excellent for small plants, the digger will handle almost any size plant, and digs the holes for them much more rapidly. To use, take hold of the handles, and press them together slightly, thus forcing the bottom of the pipe to expand. Then push the tool into the soft earth, using a slight circular motion, until the proper depth for the hole required is reached. By pulling the handles apart, the lower part of the pipe is made to pinch the earth together, and it may be lifted out and thrown to one side. The result is a clean-cut hole. Since the operation takes but a second, it is possible to dig row after row of holes in a very short time. Also, it is possible to dig plants from the cold frame or hotbed in the same way, and with the same saving of time. The two operations, when combined, make it possible to set out a large bed of plants very quickly, and since this method does not disturb the roots of the plant, it does better work than most methods. The digger and the marker are particularly useful in large gardens.

Adjustable Sales Sign



A Touch of the Finger Changes This Sign to Indicate a Changed Price for the Article

A variable sign made from pasteboard and two blocks of wood, as shown in the sketch, will make a good appearance in any retail store. The material on which the price is being given is described on a card inserted in the rack in the upper left-hand corner. The two dials are turned so as to indicate the proper number or cents per dozen, quart, pound, etc. The space below can be used for any general advertisement. In order that the two disks may be set as close to each other as indicated, one must be lapped over the other. As the disks are merely ordinary cardboard, this does not require any change in the mounting, except that a washer can be inserted between the disk and the heavy cardboard face on one of the two center screws.—P. P. Avery, Garfield, N. J.

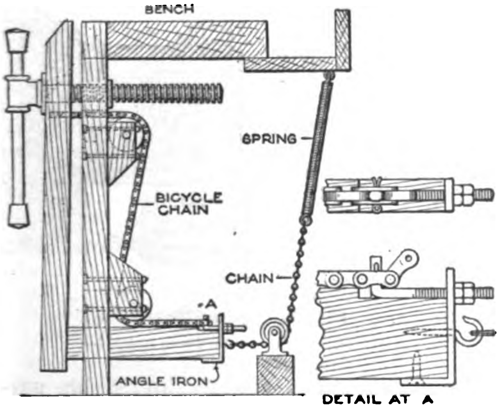
Reading Marks Stamped in Metal

Many objects made of sheet metal have letters or numbers stamped in them, which are sometimes difficult to read. A thermometer, whose metal had the figures stamped in it, was much improved by the process of painting the scale with heavy white paint from the bottom of a can, and carefully scraping the surplus with the edge of cardboard. The stamped numbers were left filled with the paint, and thus made easy to read.—C. H. Chapman, Deer River, Minn.

Parallel Motion for Bench Vise

The old-style wooden bench vise is still a very popular and useful part of the carpenter's bench. As ordinarily used, it has the disadvantage that the jaw does not move parallel with the side of the bench, and the lower end has to be controlled by some means independent of the vise screw. The illustration shows how, by means of two chains and a spring, the bottom of the vise may be made to move with the top; that is, to remain in the same angular position relative to the side of the bench.

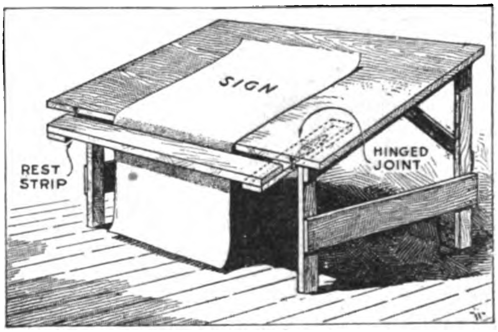
A discarded bicycle, or motorcycle, chain is fastened to the jaw of the bench vise just below the screw, and passes through the side of the bench, over one of the rollers and under another, to the fastening of the other end, at A. To the angle iron placed at this point is also fastened a chain leading around a pulley, and up to a long coil spring attached to a screw eye. As the vise is opened, the bicycle chain pulls the lower end of the vise jaw out exactly the same distance that the upper end moves. As the vise is closed, the spring pulls the lower end in, keeping the bicycle chain taut. The end of the bicycle chain, at A, is pinned over the end of an L-bolt, shown in the detail. An adjustment is thus provided, by which the vise jaw may be kept parallel with the side of the bench, or the upper end slightly closer, so that the work is always gripped tightest at its upper edge.—Chas. S. Rice, Washington, D. C.



A Mechanism Made from Odds and Ends Provides a Bench Vise with a Parallel Motion

Bench Attachment Protects Sign While Painting

Long signs are difficult to paint, since it is not possible to lay all of the paper upon the drawing bench at once. The sign painter often spoils the sign by leaning against the paper where it goes over the edge of the bench, thus creasing and soiling it.



A Rest on the Sign Painter's Desk Protects Long Signs from Creasing and Soiling

The attachment shown in the drawing protects the sign by providing a rest, against which the painter may lean without touching the sign itself. The pieces which hold this rest are hinged under the table top, so that the attachment can be dropped out of the way while painting small signs. It is held in place, when in use, by hooks which catch into screw eyes in the edge of the table.—Arthur J. Kelly, Brooklyn, N. Y.

Gardening in the Cellar

Mushrooms are not the only plants of food value that can be grown in a cellar, or in any warm and rather damp place where light is absent. Success has attended the cultivation of such plants as rhubarb, endive, sea kale, etc., all of which are highly valued in a blanched condition. Strong clumps of roots are packed away in boxes with a little soil. These are placed on the floor of the cellar, and a little water is given as required. The rate of growth is astonishing, even in winter. Owing to the absence of light, the stems elongate much more rapidly than under normal conditions.

¶To make the rollers on roller skates wear evenly they should be changed from time to time, using them on both the inner and outer sides of the skate.

Knob on Stairway Rail an Aid to the Blind

In England, where many men have lost the use of their eyes through wounds received in the war, the device illustrated has been adopted in the houses of some of the sightless heroes. It is a knob or button placed on the stairway rail, so that it indicates the exact position of the person touching it with reference to the steps in front of him, thus making it unnecessary for him to locate the steps by means of his stick.

The Blind Man Quickly Learns the Exact Position of the Steps Relative to the Knob

Burning Soil to Release Plant Foods

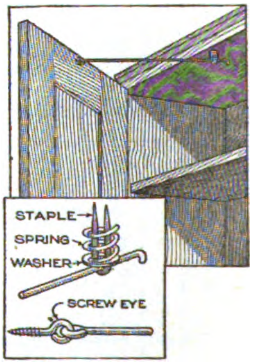
Certain soils of volcanic origin are notable for their fertility. The passage of earth through fire helps to set free plant foods that are unavailable in their original state. Following up this idea, it has been shown that by burning the soil used in greenhouses, and to a limited extent in gardens, its condition may be improved to a greater extent than by the adding of fertilizers. It is only possible to burn a portion of the soil, and this is carried out in the following manner: Heaps of any kind of rubbish that will burn are collected, and the soil, in a fairly dry state, is intermixed. The whole pile is then set afire, and by the time the rubbish has been reduced to ashes, the burning of the soil will be completed. In its new state, potash and other valuable constituents have been added by the burned trash, and released in the soil, in such a form that they can be used by the plants. This burnt soil, with the ashes, is simply dug lightly into the ground, and the resulting crops are thereby considerably increased.

Air Tank Carried on Auto

An old steel tank, of the type widely used, until recent years, to contain dissolved acetylene for automobile headlights, was attached by a car owner under the rear seat of his car, to carry air under pressure for use in case of tire trouble on the road. The tank was of the largest size used for acetylene headlighting. It was provided with a high-pressure rubber hose, long enough to reach to any of the tire valves, and was equipped with a pressure gauge, similar to those found on tire pumps. Such a tank will easily withstand any pressure ordinarily found in garage air tanks, and it was found to contain sufficient air at such a pressure to inflate two tires. The tank was filled by means of an ordinary tire valve, screwed and soldered into the side of the tank.

Holder Keeps Cupboard Door in Any Desired Position

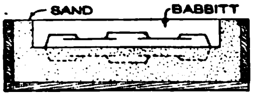
A simple device for holding a light door at any point can be made in a few minutes from a short piece of stiff wire, a screw eye, a wire staple, and a small spring. With a round-nosed pair of pliers turn a small loop on one end of the wire, and attach it to the screw eye, which should be screwed into the back of the door about one-third of width of the door from the hinged edge, near the top. The staple, in which the wire slides, should be narrowed until the sides are ¼ in. apart. Place it on the underside of the top of the cupboard, about ½ in. back from the edge, and an inch or two farther from the hinge than is the screw eye. The exact position is easily found by trial, before driving in the staple. Procure or make

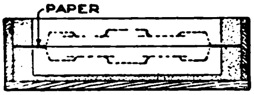


a small coil spring, about ¼ in. in diameter, and place this, with a washer, over the staple before inserting the wire. The spring should exert enough pressure on the wire to hold the door by friction, in any position. Bend the end of the wire down to act as a stop for the door when wide open.—Morris G. Miller, New Rochelle, N. Y.

Templates for Irregular Castings Made of Babbitt Metal

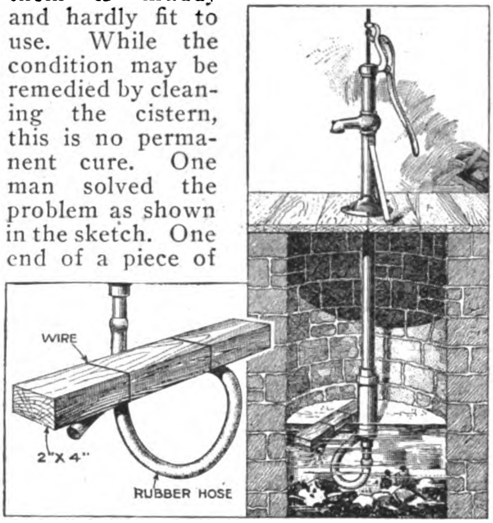
Where a number of iron or brass castings are to be drilled without gauging accurately the position of the holes from any finished surface, and especially where the casting is of such a shape that it will not rest flat on the table of the drill press, a template made by pouring babbitt around one of the parts, or a jig made by boring two of these templates to fit together, will be found very useful. To cast the template, or the first half of the jig, simply sink the iron casting in a box of sand down to its horizontal center line, and pour the babbitt around it. After the metal has cooled, remove both the casting and the babbitt template, and drill the holes, carefully laid out, through the casting, continuing them on through the template. If the part is one which will not rest level on the drill-press table, and it is therefore desired to complete the jig, this is done by sinking the babbitt template into sand, as shown below, placing in it another part which has not yet been drilled (or the first part with the holes plugged with wood), and pouring babbitt again to the same thickness. Pieces of paper, laid between, will prevent any danger of the two babbitt castings adhering to each other. After this second babbitt piece has cooled, the holes are continued through it, using as templates the first babbitt casting and the part from which it was made. The jig is now complete, unless it is desired to add hinges or clamps to enable it to be used more rapidly. The price of babbitt metal is so high that this method of making jigs would hardly be economical where the jig is to be kept indefinitely, but where one is desired on short notice for temporary use, it is a good method to remember.—Earl Pagett, Cherryvale, Kan.





Float in Cistern Provides Cleaner Water

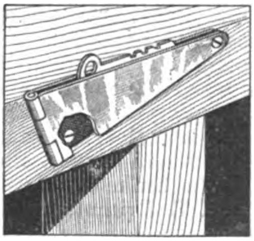
Many cisterns have so much sediment in the bottom that the water pumped from them is muddy and hardly fit to use. While the condition may be remedied by cleaning the cistern, this is no permanent cure. One man solved the problem as shown in the sketch. One end of a piece of hose was attached by wire to a short length of 2 by 4-in. lumber, the other end of the hose being attached to the lower pipe connection of the pump cylinder. This block, floating upon the water in the cistern, holds the free end of the hose above the sediment at all times. The water pumped from a cistern equipped in this manner is always clear and contains a minimum of dirt.—Merlyn C. Mayo, North Loup, Neb.



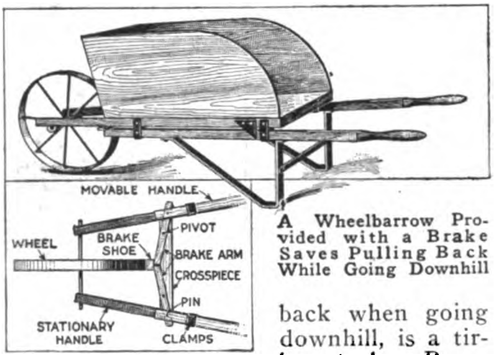
A Float Holds the End of the Hose above the Sediment, Insuring the Pumping of Clean Water at All Times

Hinge Makes Key Vise

When in need of a vise to hold keys, or other small objects, it is only necessary to secure a strap hinge and two screws. One strap of the hinge is screwed to the edge of the workbench, and the other strap closed over the key, or other object, by tightening a screw inserted through the end holes of both straps. This cheap hinge vise is strong enough for many small jobs, and can be attached to the workbench in a few minutes.



Automatic Wheelbarrow Brake Helps When Descending Inclines



A Wheelbarrow Provided with a Brake Saves Pulling Back While Going Downhill

To hold up the handles of a loaded wheelbarrow and at the same time hold back when going downhill, is a tiring task. By a simple arrangement, the handles may be made to brake the wheel automatically when going down, and as automatically release the brake as soon as level ground is reached. The steeper the hill, the harder the brake will be held against the wheel. The regular handles of the wheelbarrow are cut off at the back end of the body. Then, under these, a second pair of handles are fastened by strap-iron links, on both sides of the handles, so that they can move back and forth 2 in. Brake arms reach from each handle's front end to the brake piece that fits against the wheel. The length of these will depend upon the width of the wheelbarrow, the average length required being about 12 in. The brake arms are pinned to the handles, and work on a pivot at the center, which is fastened into the crosspiece of the wheelbarrow. It is evident that when the handles are pulled back, as in going downhill, the brake will be caused to press against the wheel. As soon as level or uphill ground is reached, the handles are pushed ahead and the brake is taken off. The lower handles have only the amount of slide necessary, the triangular pieces beside the rear links stopping the forward push of the handles and the brake stopping the backward pull. If more leverage is desired, so that the brake will press the wheel harder, simply place the pivots in the brake arms nearer the brake shoes. —F. E. Brimmer, Dalton, N. Y.

¶Tacks with large rubber heads, procurable at about five cents a dozen, make good insulators for electrical-instrument bases, one being put into each corner.

Lubricating Driving Chains with Graphite and Tallow

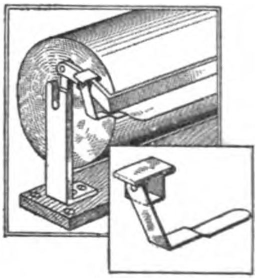
A few teaspoonfuls of flake graphite stirred into melted tallow or paraffin makes an excellent lubricant for exposed silent-chain drives. In addition to eliminating wear, this lubricant does not collect dust and dirt. It is very effective as a spring lubricant, staying in place well, and wearing longer than oils or greases ordinarily used for lubricating this kind of chains.

Running a Sewing Machine Backward

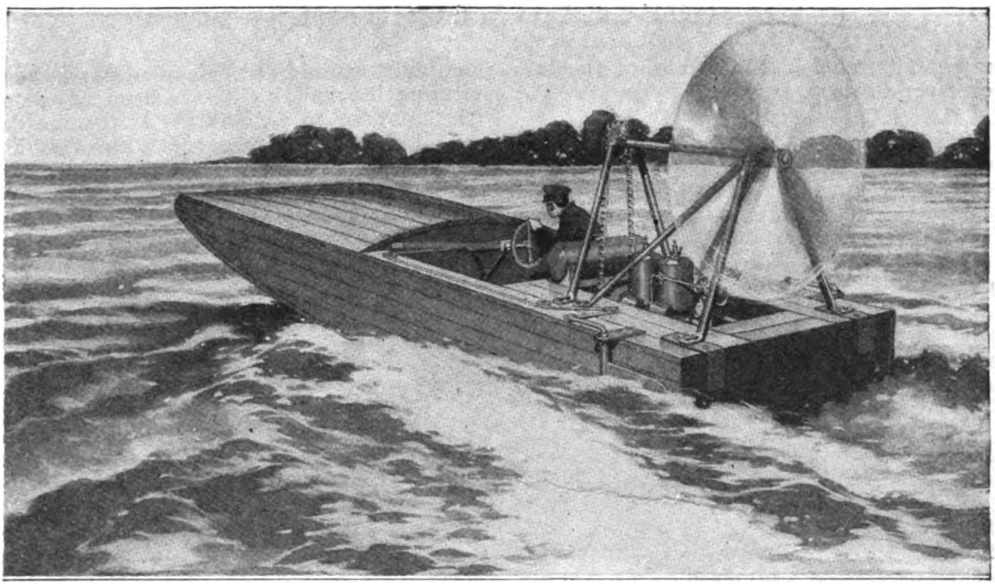
It is a great convenience to be able to backstitch with the sewing machine while finishing the ends of the hems in napkins, dish towels, or other small articles. Most machines, however, will only break the thread and not stitch when run backward. By raising the presser foot slightly, and starting the flywheel in the reverse direction, some machines can be made to backstitch nicely. It will be necessary to experiment somewhat before the proper height for the presser foot can be ascertained.—Winnifred K. Stabler, Olympia, Wash.

Finger Aids in Removing Paper from Roll

Much time is wasted in stores using roll wrapping paper, because of the tendency of the paper to adhere closely to the roll, making it hard to get hold of easily. The metal finger shown in the sketch holds the end of the paper away from the roll at all times, thus making it easy to grasp.



Three parts, cut from sheet metal, make up the attachment. The finger is bent as shown, and should be filed to a fairly sharp edge where it touches the paper roll. It is riveted to a U-shaped piece, which fits under the arm that carries the paper-cutting bar. The third piece is a cap that slips over the projections on the U-shaped piece and holds the attachment on the arm. As long as the finger is in place, it holds the end of the paper away from the roll so that it is easily grasped.—W. A. Saul, Lexington, Mass.



The Air-Propelled Hydroplane Moves Gracefully and Speedily over the Shallow Waters of the Small Lake or the Beach, Where Ordinary Craft might Find it Hard Going on Account of Danger of the Propeller Striking Bottom

Building an Air-Propelled Hydroplane

By F. D. BURKE

NEXT month Mr. Burke, who is an aeronautical designer of wide experience, will describe the building of an air-propelled speedster, or "wind wagon." As in the present article, the materials called for are such as are easily procurable at a low cost, and the design is worked out with a view to the greatest possible simplicity.—Editor.

THE high efficiency of modern air propellers has led to their adoption on land vehicles and boats which are not intended to rise from the surface. The great advantage of the air propeller for a boat is that it enables the craft to travel on very shallow water. In fact, the faster such a boat travels, the less depth of water it "draws."

The little craft here described is of the stepless type of hydroplane. The hull is of wood, 12 ft. in length, and 40 in. in width, or beam. The engine recommended is a light four-cylinder one, of 18 to 22 hp. The framework supporting the propeller and transmission is of steel tubing. With a motor of the type specified, the boat should develop a speed of 25 to 30 miles per hour; a twin-cylinder motorcycle engine may also be used with it, but the speed to be obtained with the smaller engine will, of course, be proportionately lower. The material, a list of which is given below, need not cost more than $80, including the propeller, but not including the engine.

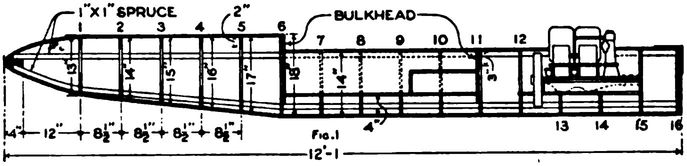
Operating the Hydroplane

In operating a boat of this type, the builder will find that when it is fully loaded and at rest, the stern will rest much deeper in the water than the forward end. As the boat acquires speed, it will gradually come to a level running position. This is due to the fact that the thrust from the propeller is some distance above the boat, and tends to raise the stern and lower the bow. If, owing to any error in construction, the bow of the boat does not stand well up out of the water when at rest, great care must be taken when first operating the boat, that the propeller thrust does not force the bow to "nose down" into the water.

When running at good speed, it will be found that very little of the rudder is immersed. In turning, however, the boat will tip inward slightly, thus increasing the hold which the rudder has in the water. This "heeling" may be aided, when necessary, by the operator leaning toward the side to which he wishes to turn. No attempt should be made to carry more than two persons in the boat, and the possibility of carrying more than one will depend largely on the weight of the persons. Caution should be used at first, until the operator gets the swing of the boat's motion and becomes acquainted with its control. He will then begin to appreciate the freedom of movement possessed by a boat which requires but a few inches of water, and whose propeller does not get tangled in the weeds of the lake or river bottom.

Hull

The framework consists of 16 transverse members, spaced equidistant, and tied together by spruce and ash longitudinals. These transverse members are numbered, in Fig. 1, from 1 to 16. Those at the rear should be made first. Nos. 12 to 15, inclusive, are cut to the dimensions given in the lower view, Fig. 2. They are made up of pieces of ½-in. spruce, and should be assembled as shown in Fig. 2. The corners of the spruce pieces are fastened together by steel straps. There are two of these to each corner of the transverse members, one on each side of the joint. They should be riveted together with hollow copper rivets, or with light nails clinched over, if rivets are not obtainable. No. 6 is made to the dimensions given in the left upper detail; it consists of a framework of ½-in. spruce, with the addition of a solid piece of spruce, transforming it into a bulkhead. Nos. 11 and 16 are similar, except that the upper member of the frame, 3 in. wide, runs straight across, instead of being sawed to a curve. No. 11 forms a second bulkhead, while No. 16 is the rear end of the hull. Cut the solid pieces for these three members from the 5/16-in., five-ply veneer, to the outside dimensions given for the three members. The spruce frame pieces are then placed on the veneer, with their outside edges flush with the edges of the veneer. They are fastened in place with wood screws. Nos. 7 to 10 are made to the form and dimensions given to the right, in Fig. 2, and are of ½-in. spruce stock. Nos. 1 to 5 are made similar to No. 6, but they are of different depths, as dimensioned in Fig. 1.



The Profile of the Hydroplane Shows the Simplicity and Lightness Attainable in This Type of Boat

The spruce bow piece is made up of two 2 by 4-in. pieces, shaped as shown in the detail in Fig. 2, and bolted together. The longitudinals are set into it and screwed down, as shown, and the keel and stringer pieces are similarly attached.

Hull Assembly

Before the frame assembly is begun, two of the 1 by 1-in. by 13-ft. spruce longitudinals should be steamed and bent around blocks which have been nailed to the floor, or to a plank, so as to give the wood the necessary curve. They should be allowed to dry on the bending form for two or three days; when taken off, they will hold approximately the right shape. They can be easily sprung into place on assembly.

The two top longitudinals are first put into place, and are attached to the transverse members by 1½-in., No. 4 wood screws, as shown in Fig. 2. For attaching to the bow piece, 2-in. screws will be preferable. The bottom longitudinals are next assembled, working forward from the rear of the hull, the curved ends being fastened last. In springing these ends into place, care must be taken to keep the top longitudinals straight, the lower ones being curved up to meet them.

The light stringer pieces, to which the planking is screwed, are next put in. They are of ¼ by 1-in. ash, and run the entire length of the hull. They should be set into each of the transverse members, and fastened with a ⅝-in., No. 3 wood screw. They must be spaced so that the distance between centers is the same as the width of the planking, plus an allowance of 1/16 in. for clearance. The keel, of 1 by 1½-in. ash, should also be steamed

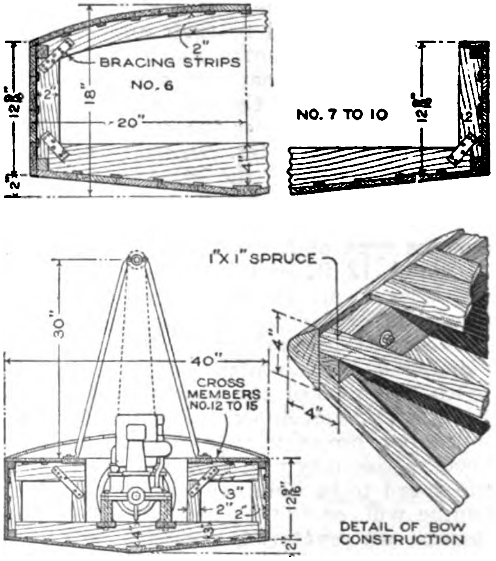


Fig.2

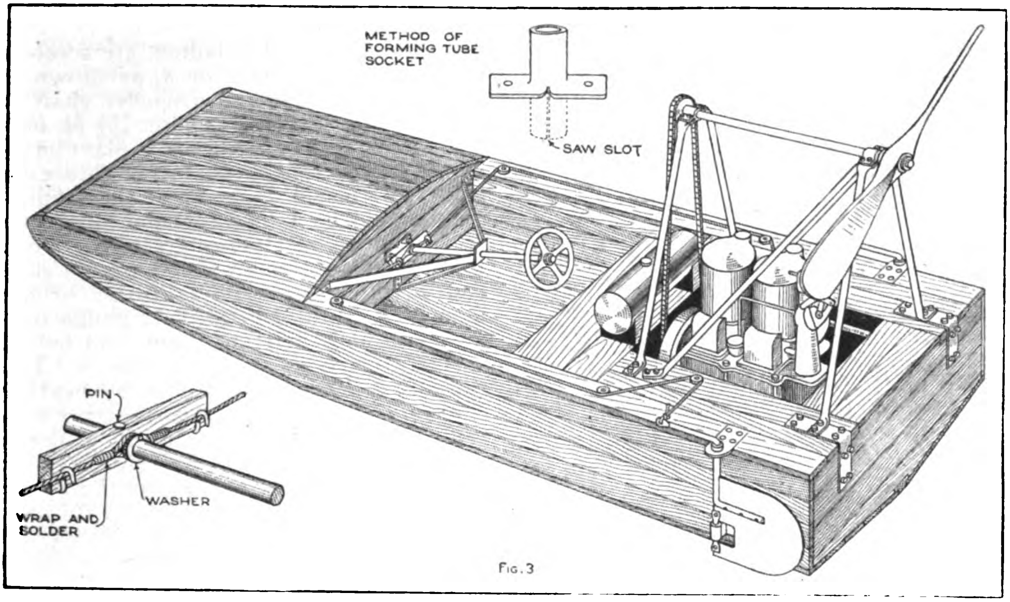
Details of the Hull: The Construction of the Cross Members Determines the Shape of the Various Parts of the Boat and bent over the same form as the spruce longitudinals. It is fastened into place by a 1½-in., No. 4 wood screw, where it joins each of the transverse members.

Engine Bed

The members of the engine bed, or bearers, are of ash, and are assembled as shown in Fig. 2, and fastened to the bottom cross members, as shown. The size and distance apart will depend on the dimensions of the engine to be used.

Planking the Hull

The hull is now ready to plank. The ⁵⁄₁₆ by 3-in. cedar is used to plank the bottom; the sides and deck are ¼ by 3-in. cedar. Plank the sides of the hull first. A thin coat of marine glue should be given the side of the upper longitudinals, and the first stringer piece below it. A strip of unbleached muslin, 1 in. wide, is laid in the glue. Both edges of the first plank are given a thin coat of this glue; a plank is then placed against the side of the hull, with its upper edge flush with the top edge of the longitudinals. The edge of the plank should come about ¹⁄₃₂ in. from the center of the first stringer piece. The plank is then fastened on with ½-in., No. 2 wood screws, placed about 2 in. apart, in each cross member. In placing the second plank, a space of ¹⁄₁₆ in. should be left between it and the first one. This is to allow for any swelling of the planks which might take place later. The rest of the side and bottom planking is put on, as just described. The top is left open until later.



Assembly of the Hydroplane: Steering Is by Means of Two Rudders Controlled by an Automobile Steering Wheel. The Chain Drive Permits the Use of Sprockets Which will Give the Best Running Speed for the Propeller Used

Steering Gear

Two pieces of ⅛ by ½-in. strap iron are bent as shown in Fig. 3, and then riveted to a piece of No. 12 gauge sheet steel, to form a tripod. This is bolted to the bulkhead with ¼-in. bolts. A large washer should be made of No. 12 gauge sheet steel to take the bolt heads on the forward side of the bulkhead. The steering column is a piece of tubing of the length that will bring the steering wheel to the position desired; its diameter will be governed by the size of the hole in the wheel used. An old automobile steering wheel will do for this purpose very nicely. The end of the tube fits into a tubing socket bolted to the bulkhead, as shown. The rudder bar is of ash, and is slipped onto the tube and fastened with a pin through it.

The rudders are of No. 16 gauge sheet steel, 10 by 12 in., riveted to a ½-in. steel rod, which is flattened where it is fastened to the rudder blade. The hinges are of No. 12 gauge sheet steel, and should be fastened at the point on the hull just opposite transverse member No. 14. From each of the two rudders, a flexible steel cable, ⅛ in. in diameter, running through pulleys fastened to the deck, is spliced and soldered around the steering post.

The operation of the steering gear is clearly shown in Fig. 3. Turning the wheel to the left causes the hook at the left of the rudder bar to come in contact with the steel cable, which pulls the rudder on the left-hand side into action.

The entire inside of the hull should now receive one or two coats of good marine paint, and the forward deck should be planked. The inner surface of the deck planks should also be painted before being put on. The seat should be put in, as shown in Fig. 3.

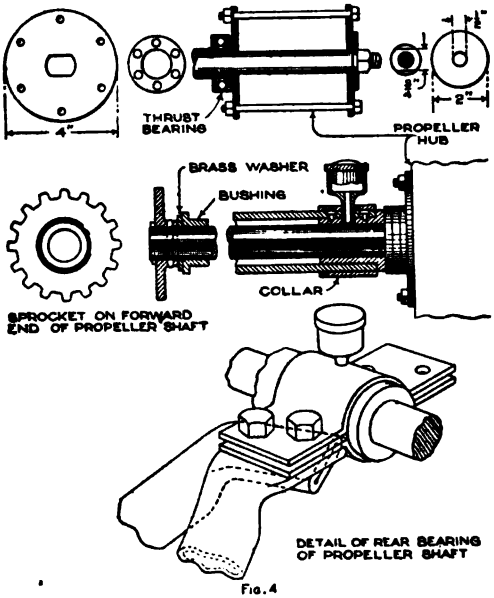

4"
THRUST BEARING
1/2"
3/4"
2"
PROPELLER HUB
BRASS WASHER
BUSHING
COLLAR
SPROCKET ON FORWARD END OF PROPELLER SHAFT
DETAIL OF REAR BEARING OF PROPELLER SHAFT

FIG. 4

Details of the Propeller Mounting: The Framework Is of Steel Tubing, in the Style Used in Airplane Construction to Produce Great Strength with Light Weight

Power Plant

The engine used should be of 18 to 22 hp., as stated above, if high speed is desired. It is not advisable to use a more powerful engine than this, as the craft might thus be overpowered and overweighted. An automobile engine is not likely to give very good service, although certain automobile engines, of 3¼-in. bore and under, might do very well if not worked too long at high speed. Motorcycle engines of the large sizes now being manufactured and rated at from 9 to 13 hp. will also drive the boat, but cannot be expected to give as good service as a marine motor with thorough water cooling. The engine should be provided with a sprocket, and a drive chain of suitable size and length. If the engine is of the motorcycle type, then it will be safe to use a motorcycle chain, but if a more powerful engine is used, a chain and sprockets must be provided which are capable of transmitting the full power of the engine.

The ash strips, 1 by 6 by 42 in., to which the propeller stand is bolted, are screwed into place on the rear deck, as shown in Fig. 3. To house the propeller shaft, a piece of No. 12 gauge tubing, 1½ in. outside diameter, 2 ft. long, has a plain bushing of antifriction metal forced into each end. The inside diameter of these bushings should be 1 in. Such bushings can be picked up in almost any repair shop. Sheet-metal collars are fitted around each end of the tube. The four legs of the mounting are of 1-in., No. 12 gauge tubing, with ends flattened, bent, and bolted to the collars, as shown in Fig. 4. The tubes can be neatly flattened by heating the ends and crushing them together in a vise. Two other tubes, running down forward from the rear bearing, are put in to take the thrust of the propeller. The propeller shaft should be about 3 ft. long, and 1 in. in diameter. One end should be turned down to ½-in. diameter for a distance of ¾ in., and should then be threaded for a ½-in. nut. This should be a left-hand thread, with a nut tapped to correspond. If it is not practicable to cut such threads, a right-hand thread may be permissible, if a good, heavy, castellated nut is used with a stout cotter pin.

On the same end the shaft should have two flat surfaces, filed as shown. Two disks of ⅛-in. sheet steel should be made as shown in Fig. 4. A 2-in. washer of No. 12 gauge sheet steel fits over the threaded end of the shaft.

The propeller mounting should now be set up, and the propeller placed on the shaft and bolted between the two disks. The 2-in. washer is slipped on, and the large nut is drawn up snugly. A 1-in. thrust bearing should be placed on the shaft and pushed up against the propeller hub. The propeller shaft should then be pushed through the bearings, and a thin brass washer slipped on the forward end of the shaft. The driving sprocket selected should have a shoulder as shown, which should be forced up against the end of the forward bearing with the brass washer in between, and the shaft pushed in until the propeller hub is pressing firmly against the thrust bearing. The location of the driving sprocket should then be marked, and the propeller shaft taken out and drilled for a taper pin, or a keyway may be cut so that the sprocket will be locked in place. The whole propeller unit should now be assembled and set up on the rear deck. The drive chains should be placed over the sprocket on the propeller shaft and around the driving sprocket on the engine shaft. The propeller stand should be moved forward or backward until the two sprockets line up properly. The stand should then be bolted in place. Two iron straps, bent over the rear edge as shown in Fig. 3, and fastened with screws, will strengthen the base of the rear legs against the pull due to the propeller thrust.

The rest of the rear-deck planking is now put on, and the gas tank is mounted, as shown. The hull should be given two or three coats of good spar varnish.

The Propeller

The propeller used with the 20-hp. engine will be about 5½ ft. long, and should revolve at a speed of about 1,500 r. p. m. A pitch of 4 ft. is recommended, in order to give the highest speed, although this will depend on the actual horsepower which the engine delivers. It is, of course, possible to make the propeller by hand, but the manufacture of propellers has now advanced to such a point that very satisfactory ones can be bought on the market at prices not at all exorbitant. A good propeller should be obtainable from any house handling this class of aeronautical supplies for about $20.

Before the engine is given its first run, the propeller must be tested for alinement. The propeller should be turned until one blade just grazes the end of a stick temporarily clamped to the propeller stand. The propeller should then be turned until the other blade is in line with the stick. If the propeller is properly alined, this blade will also just graze the stick. Should there be as much as ⅛-in. clearance between the point of the stick and the propeller blade, the three bolts opposite this blade should be loosened, while the three bolts on the same side of the blade that is out of line should be tightened. The propeller should then be tested again, and if found to be in line, the three loosened bolts should be tightened up and the test repeated.

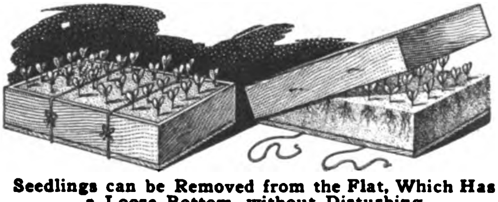
In starting the engine, retard the spark, open the throttle about halfway, stand on the rear deck and swing one of the propeller blades around quite rapidly. The engine should start after a few turns, if it is in good condition.

MATERIAL REQUIRED

4 pieces of spruce, 1 by 1 in. by 13 ft.
5 pieces of spruce, ¼ by 6 in. by 10 ft.
10 pieces of spruce, ⅛ by 6 in. by 10 ft.
2 pieces of spruce, 2 by 4 by 40 in.
2 pieces of spruce, 1 by 7 by 40 in.
1 piece of ash, 1 by 1½ in. by 13 ft.
20 pieces of ash, ¼ by 1 in. by 13 ft.
2 pieces of ash, 1 by 4 by 42 in.
2 pieces of ash, 1 by 6 by 42 in.
2 pieces of ash, 2 by 4 by 40 in.
14 pieces of cedar, 5/16 by 3 in. by 13 ft.
20 pieces of cedar, ¼ by 3 in. by 13 ft.
3 pieces of 5-ply wood veneer, 5/16 by 18 by 40 in.
24 ft. No. 12 gauge steel tubing, 1 in. outside diameter.
2 ft. No. 12 gauge steel tubing, 1½ in. outside diameter.
6 sq. ft. No. 16 gauge, cold-rolled sheet steel.
2 sq. ft. No. 12 gauge, cold-rolled sheet steel.
1 sq. ft. No. 10 gauge cold-rolled sheet steel.
8 ft. ⅛ by ½-in. strap iron.
1 steering wheel.
6 pulleys.
Wood screws, several sizes.
2 qt. marine glue.
3 or 4 yd. of heavy unbleached muslin.
2 gal. good spar varnish.
1 gal. good marine paint.
1 1-in. thrust bearing.
2 plain bearings, 1-in. inside diameter.

Seed Flat with Removable Sides

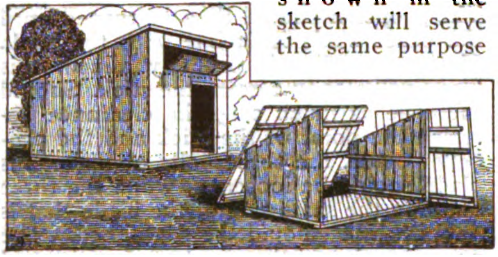
Seedlings are usually grown in wooden trays, or shallow boxes. When the plants are ready for removal, it is always rather a difficult matter to get them out without great root disturbance. A type of box that makes the matter quite easy is illustrated. It is only a few inches deep, and is fitted with a loose bottom. Strong twine is looped around its sides and bottom, and is tied above. Nails in the side of the box help to keep the twine in place. The seed flat is filled with soil in the usual manner, and the seed sown. When it is desired to move the small plants, the twine is cut or untied. The side of the box can then be easily lifted up, leaving the mass of soil with the seedlings intact. The baby plants are cut from this, with the earth clinging to their roots. Very little root disturbance is produced by this type of seed flat.—S. Leonard Bastin, Bournemouth, Eng.



Seedlings can be Removed from the Flat, Which Has a Loose Bottom, without Disturbing the Roots

A Portable Hog House

It is desirable to provide housing for hogs when they are turned into the fields after the harvest, or into newly cleared land. At such times, and at others when it would not be profitable to build a permanent house, the portable structure shown in the sketch will serve the same purpose at little expense. It can be used elsewhere at short notice, since it can be knocked down very easily, and the parts transported from one place to another on an ordinary farm wagon.



This Portable Hog House Provides Shelter for Animals Turned into Temporary Pastures, and can be Built at Small Expense

The building is made in six parts, which fit together easily, and are then held in place by a few nails, or by hooks and staples. For ease in transporting, the building should not be more than 8 ft. square, and 7 ft. high at the front part of the roof. It should be made of 1-in. lumber, with 2 by 4-in. framing pieces. Although not absolutely necessary, it is now considered best to have floors in such buildings.

After the hog house has been set up, 2 by 4-in. pieces should be fastened across the building, about 1 ft. from the sides and 1 ft. above the floor. These serve the double purpose of bracing the structure and of protecting the smaller pigs from being crushed by the larger hogs. One advantage of such a building is that it may be stored in a very small space when not in use.—S. R. Winters, Washington, D. C.

Nail Set Kept in Hammer Handle

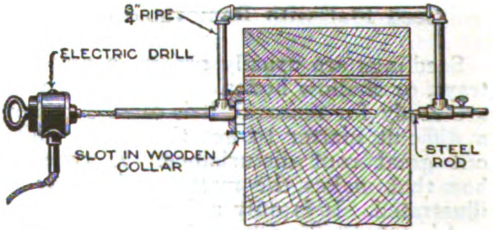
Since a nail set is always used in conjunction with a hammer, it is well to keep both of them together, and guard against the loss of the smaller article, which, because of its smallness, is often misplaced. This may be done by boring a recess in the center of the hammer handle for the deposit of the nail set. A small cork, or wooden plug, prevents its falling out.—Abel Green, New York, N. Y.

Removing Paint with Vinegar

After glass is set, the new putty is painted. If the work is not carefully done, paint is smeared on the glass. This may be removed with a cloth dipped in vinegar, or acetic acid. Brushes that have hardened paint on them can be softened by the use of vinegar or acid.—L. E. Fetter, Portsmouth, N. H.

Guide for Drilling Holes through Large Timbers

When boring holes through thick timbers, it often happens that the drill does not come out in the right spot on the opposite side of the timber. A guide made of pipe fittings will remedy the difficulty. Make up a ¾-in. pipe body for the guide, large enough to fit over the timber with several inches to spare. Screw a tee to each end. Into the tee which is on the side of the timber where the drill emerges, screw two short pieces of pipe, into which a length of sharpened steel rod can be slipped. Into the other tee screw a 20-in. length of pipe, and adjust the guide, by sighting and bending, so that this pipe is exactly in line with the steel rod at the other end of the guide. Make a wooden collar to fit loosely over the tee which has the long pipe in it. A hole or slot must be cut in one side of this collar, for the chips to fall through. To use the guide, drive the steel point into the spot from which the hole should emerge. Then, after slipping the wooden collar over the tee, slide the drill into the long pipe, and start the hole at the proper spot. The guide must be removed before the drill strikes the end of the steel rod. If the timber is thick, the hole can be bored first from one side, then from the other, the guide being used both times. Since this guide can be made any size, it may be used in a great many cases, and should simplify the boring of long holes.—C. R. Simmons, Portland, Ore.



By Using a Simple Guide, Holes may be Drilled Accurately through Large Timbers Such as Used in Bridges and Ships

A Disappearing Cooling Chest

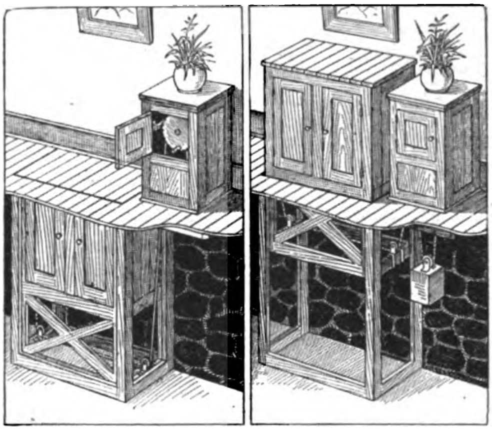
By VINCENT BROWNLEY

A FEW hours spent in building a sort of dumb-waiter chest, or cupboard, similar to the one shown in the sketch, will not only save many weary steps, but will improve the quality of the summer food. Since it must be made to fit into the place where it is to be used, only a general description, without dimensions, will be given. It may be adapted to the needs of stores and restaurants, as well as of private homes.

The cupboard should be quite strong, as its top, when in the lower position, is to serve as part of the floor. This top should be made to resemble the rest of the flooring as nearly as possible. A heavy base is provided for the cupboard to rest upon when lowered into the cellar; this base fits snugly into guides attached to posts extending from the basement floor to the joists of the floor above.

In order to hoist the heavy cupboard easily, a system of pulleys and a counterweight will be necessary. The rope is tied into a heavy U-bolt, or staple, in one of the joists, on the side of the cupboard opposite the counterweight. From the eye it is carried down to the base, under two pulleys, up and once around the hoisting drum, then down to the pulley from which the counterweight is suspended, and finally to another eye or staple in the floor joist. The counterweight may be a block of concrete, or a barrel or keg filled with stones of almost sufficient weight to balance the cupboard.

The hoisting drum is a pulley or sheave, made up of two 12-in. disks of 1-in. wood with beveled edges, nailed together so that these bevels form a groove. To one side of the sheave is fastened a disk of sheet iron, into which teeth have been cut with a hacksaw. The center hole is fitted with a bushing of brass tubing, and the assembled wheel or drum revolves on a ½-in. lag bolt. For a crank, or handle, a short piece of pipe on a bolt is placed at one edge of the ratchet disk. A small cabinet houses this mechanism, and may also serve as a flower pedestal or small table. Access to the crank is obtained by opening a small door built in the upper part of the case. The rope from the pulley on the base of the cupboard encircles the hoisting drum once, then drops to the pulley from which the counterweight is suspended. The friction caused by the rope on the drum, under the weight of the cupboard on the one side, and of the counterweight on the other side, keeps the rope from slipping. A small iron pawl, such as a bolt bent to shape, and filed at one end, fits into the teeth on the drum, making it possible to hold the cupboard at any point desired.

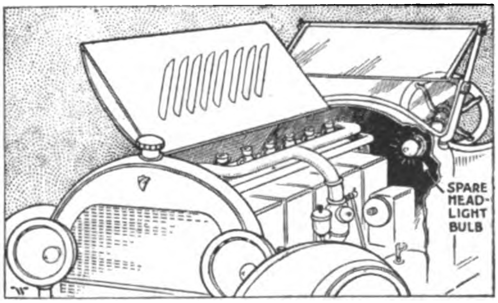


By Turning the Crank the Chest is Quickly Raised from the Cellar to the Kitchen Whenever Required

The cooling cupboard may be made any convenient size, and does away with a great deal of unnecessary stair climbing, keeping food in good condition at all times.

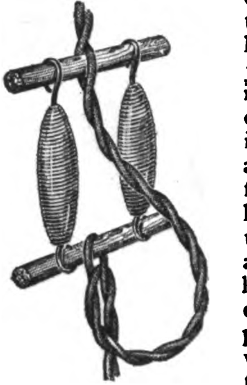
Spare Bulb for Auto Headlights Used under Hood

Every driver of an electrically lighted automobile should carry somewhere in the car a spare headlight bulb, as these may blow out at any time. Instead of carrying the spare bulb in a box under the seat, it is a good idea to mount a socket in the position shown, connecting it through a simple switch to the storage battery. The spare bulb thus forms a very convenient light for illuminating the engine, and the socket may also be found handy for attaching a trouble light.



The Spare Headlight Bulb Is Used to Illuminate the Space under the Hood When Work is being Done on the Engine

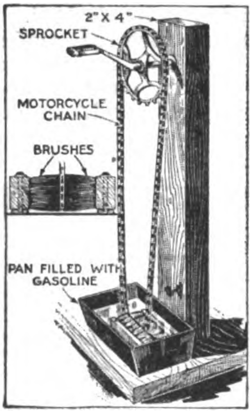
Shock Absorber for Electric Light



In factories or other places where heavy work is done on all floors, breakage of electric-light bulbs is an almost regular occurrence, due to the fact that the lamps receive heavy jars from the pounding of the machinery, or dropping of castings or other heavy articles upon the floor. This may be largely overcome by using a simple shock absorber upon each lamp. Two canary-cage springs, suspended between wooden rods, hold the heavy lamp and shade fixture in such a way that all the shock from the floor above is taken up by the springs. In this way, no jar is transmitted to the delicate lamp filament.—E. E. Hansen, New Britain, Conn.

Device for Cleaning and Oiling Motorcycle Drive Chains

The drive chains of a motorcycle are subject to more wear than any other part of the machine, because of the dust and grit the chain picks up, and because the owner frequently neglects to care for it.

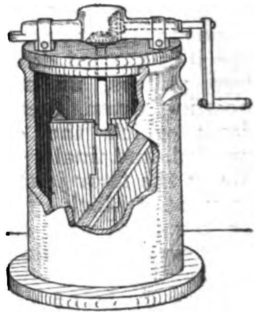


A device for cleaning and lubricating chains is shown in the sketch. If used properly, it will not only lengthen the life of the chain, but will increase its efficiency.

The device consists of an ordinary motorcycle drive sprocket mounted on an old bicycle crank, which in turn is set up on a piece of 2 by 4-in. timber, fastened to the top of the workbench. At the base of the upright is fastened a small bread pan with two stiff scrub brushes secured to the sides. To clean a chain, it is only necessary to remove it, and hang it over the sprocket. At the lower end, let one side of the chain pass around one end of the brush bristles, the other side coming up through them. Fill the pan with gasoline, and turn the crank. A few turns will be sufficient, unless the chain has gone without attention for a long time. When the chain is clean, wipe off the gasoline with a linen rag, and allow the chain to dry thoroughly. The proper stiffness of bristles and setting of the brushes will be readily discovered after a little experience in using this method.

To lubricate the chain, place it on the sprocket again, and run it through another pan in which a mixture of heavy oil and powdered graphite has been placed. When this has worked into the joints and under the rollers, the chain is ready for several hundred miles of travel.—John Edwin Hogg, Alhambra, Calif.

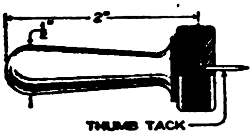
Churn with Ice-Cream Freezer Gearing



An old dasher churn was brought up to date by transferring an ice-cream freezer gearing to the 3-gal. earthenware churn jar. A wooden cover, in two parts, and also a wooden agitator, were made to fit the jar. The gears of an old ice-cream freezer were utilized for turning the dasher and were found to be just the thing when properly mounted. The freezer gearing, with gear case, was mounted on top of the cover, a block of wood being placed under each end of the case, as shown. The blocks were screwed to the cover, and bands of metal used to fasten the gear in place. The smaller gear was fitted with a rod, ½ in. in diameter, reaching nearly to the bottom of the churn. Another bearing was made for this rod by screwing a small metal plate to the bottom of the cover. The dasher was made from a rectangular piece of wood, 1½ by 1½ by 6 in., by boring a hole lengthwise to take the rod, and adding four paddles to the sides, so as to make about the angle shown. They were nailed into grooves cut into the central shaft. The rod was made removable from the small gear, so that these parts could be quickly removed, and used on the freezer when desired, in this way securing double service from the latter.—James P. Lewis, Golden, Colo.

Tool for Sharpening Thumb Tacks

Many draftsmen like the points of the thumb tacks they use to be very sharp, and are therefore not satisfied with those on the market. A convenient little device for use in sharpening thumb tacks is shown in the diagram. It can be turned from either brass or steel stock. The surface should be given a good polish, and the screw cap made to fit as accurately as possible, so that the tack point will be held rigidly while it is being sharpened with a small pocket abrasive stone. Tacks thus treated can aid materially in saving the draftsman's time.—F. H. Sweet, Waynesboro, Va.

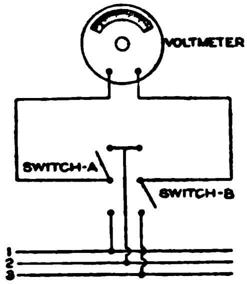


Removing Steel Screws from Brass

Pieces of brass, nickel, or copper, in which steel screws, tacks, or drills have been broken off, should be left in a saturated solution of alum, or a diluted solution of sulphuric acid. The steel will be dissolved and the brass or nickel will not be acted upon. A similar process is useful in removing steel screws from gold spectacles when they are too tight to be removed mechanically.—H. S. Hart, Shreveport, La.

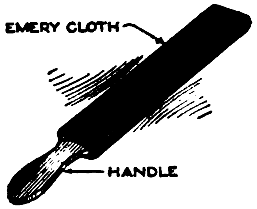
Connection for Reading Voltage of Three-Phase Circuit

The sketch shows a handy method of connecting a voltmeter for reading phase voltages of a three-phase line, by the use of two single-pole double-throw switches. The arrangement is accident and fool-proof. With switch A thrown in the upper direction, and switch B in the lower, the voltage will be that between wires 2 and 3; with both switches down, the voltage read is between 1 and 3; and with switch A down and switch B up, the voltage is between wires 1 and 2. When both of the switches are up, the voltmeter does not register.—Peter J. M. Clute, Schenectady, N. Y.

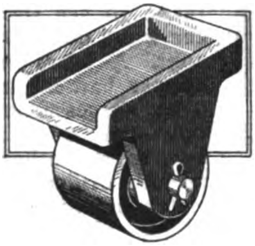


Emery Stick Useful at Forge

A stick around which a sheet of emery cloth or paper has been tacked will be found useful in the forge shop. It is sometimes more convenient than a file for cleaning the surface after hardening, so that the deeper colors may be plainly seen. The advantage of tacking a whole sheet on at once, forming several layers, is that as one layer wears smooth, it can be removed, exposing the next one for use.



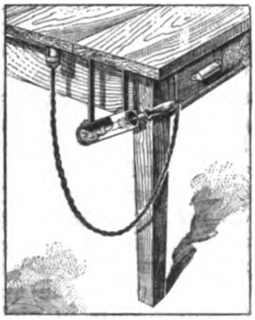
Moving Heavy Machines on Casters



Heavy casters, such as illustrated, can be placed very handily under the legs of machine tools which must be moved from one place to another over the floor of the shop.

Protecting the Tips of Electric Soldering Irons

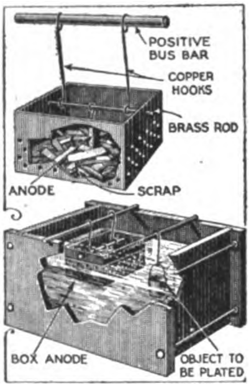
It is not difficult to prevent electric soldering iron tips, that are kept heated for long periods, from oxidizing and hardening. Make a cup to hold sufficient solder to cover the tinned portion of the copper, and fasten it in the holder, as shown in the sketch. The solder in the cup melts and prevents the air from reaching the point, thus keeping it always "tinned" and bright. The holder should be mounted at an angle under the bench, as shown, so that the handle of the iron may be grasped quickly and easily.—Alpha Dean, Chicago, Ill.



¶To save time in making working drawings, omit one side of the arrow heads on dimension lines.

Scrap Metal Forms Satisfactory Anodes for Plating

Cast anodes for use in electroplating are expensive, and at times difficult to secure. An excellent substitute is obtained by using scrap anode metal, contained in a wooden box suspended in the plating bath. Special boxes may be made to suit the requirements of the tank or the workman, but for most purposes the following dimensions will suffice. Construct a box, 12 in. wide, 18 in. long, and 10 in. high, open at the top. Bore in the sides and bottom as many ½-in. holes as possible, care being taken to see that the wood does not split. A brass or copper bar, 20 in. long, passes from one end of the box to the other, and through holes in the ends drilled for the purpose. The diameter of this rod should be not less than ½ in. The box is then suspended in the plating tank and the rod electrically connected to the positive bus bar by copper hooks. The box should hang high enough so that the brass bar in it is not in contact with the plating solution. The box is now ready for the scrap metal.



If, for instance, zincplating is to be done, a small zinc rod is hung from the metal crossbar, and the box is half filled with pieces of zinc scrap, as shown in the sketch. These pieces may be old plates, or discarded portions of zinc anodes. Since the scrap pieces make electrical contact with the small zinc rod and with each other, the result is similar to that of one large anode, the holes in the box allowing free passage of the electric current from the metal to the electrolyte.

This box anode may be used with excellent results in nickelplating. It is impossible to obtain pure nickel anodes in the form of castings, since a certain amount of impurities, such as iron, are always present. Impurities impair the quality of plating. Pure nickel can, however, be obtained in the form of pellets. If these are used in the anode box, perfect plating may be accomplished. A coat of pure nickel will last much longer, and may be given a higher polish than an inferior plate containing traces of other metals. — Kenneth Coggeshall, Webster Groves, Mo.

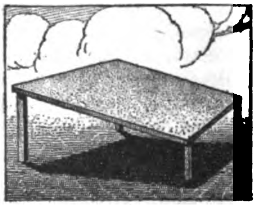
Potatoes Gathered While Vines Are Still Green

Some interesting experiments were carried out last season in connection with potato growing. Instead of waiting until the plants were matured, part of the crop was gathered when the plants had reached a fair size, the largest tubers that could be found being grubbed up from the soil. This operation was repeated a month later, and then the plants were allowed to mature in the usual manner. The last crop was quite up to the average in spite of the fact that two gatherings had been made during the growing season.

Most growers must have noticed, when they dig their potatoes, that there are always a number of small ones, about the size of marbles, or even smaller. But if some of the larger potatoes are removed during the growing season, these little ones develop into a good size. On the other hand, if the plants have already developed a fair proportion of large tubers, and these are still attached to the roots, the immature ones do not increase much in size. The soil disturbance which accompanies the removal of the potatoes positively benefits the plants. After each operation they start away with a fresh vigor of growth. This is probably due to the fact that the grubbing about in the ground helps aerate the soil.

Shelter Roofs for Poultry

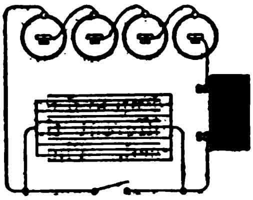
Poultry, chickens, ducks, or geese, will not thrive during the summer months when there is no shade to protect the fowls from the great heat, especially about midday. In the case of young chicks, particularly, heat and rainstorms are very destructive. The shelter roof, an example of which is shown in the drawing, can be made very quickly, and may be shifted at a moment's notice to the particular range where it will be most useful.



A frame for the roof can be made from 1 by 4-in., or other obtainable, boards. It is covered with canvas, prepared roofing, or anything that will shed water. The size depends partly on the number of fowls in the flock, but about 6 ft. square is the largest roof that can be handled easily. A roof of this size will accommodate 10 to 15 fowls. If used for a larger flock, the shelter may be made in sections, each 6 ft. square, the completed roof being 6 ft. wide, and as long as necessary.

The shelter consists of this roof, supported on stakes driven into the ground. It need not be more than 1 ft. from the ground to the roof, at the lower edge, and just enough higher at the front to give it the proper slant for shedding rain. The usual method is to place such a shelter from 5 to 10 yd. from each colony house.

Testing Ignition Condensers

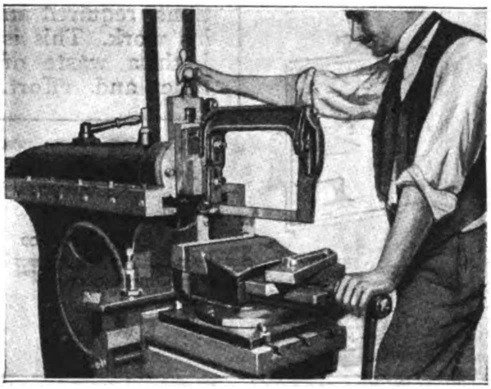


When a gasoline engine begins to miss on first one cylinder and then another, when a feeble red spark appears at the plug, when the breaker points burn quickly, and when a large amount of sparking can be seen at the breaker points while the engine is running, the chances are that the condenser is not working properly. It can be tested with the ordinary shop equipment, if wired up as shown in the sketch. The current is supplied by four to six dry cells. An ignition coil is placed in the circuit, just as used with the engine. The condenser is connected across the spark gap, with the battery in series, and the wire ends are touched together and then separated. This should be repeated with and without the condenser, using a switch to throw it into circuit, and the spark caused by separation of the ends of the wire noted in each case. If a good condenser is being tested, practically no spark will result. If a poor condenser is under test, or none at all is in the circuit, a large spark will be caused by separating the wires. It should be remembered that loose condenser connections will often give the same results as a poor condenser.—S. E. Gibbs, Urbana, Ill.

¶Ropes holding camp tents in place should be loosened at night, or moisture may cause them to contract and pull out the stakes, resulting in a wrecked tent if the weather is windy.

Shaper Used as a Hacksaw

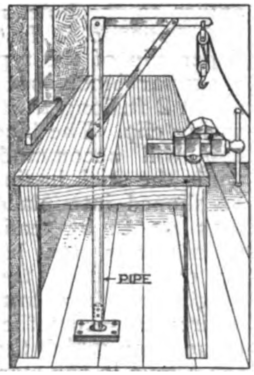
The usefulness of an ordinary shaper for sawing is particularly apparent when slanting cuts are to be made; by swiveling the vise, the saw can be set to cut at any desired angle. Certain cuts can be made in heavy castings, which could not be held in the ordinary power hacksaw, and a short stroke, possible with the shaper, is often an added advantage for this kind of work.—J. J. McIntyre, Bridgeport, Connecticut.



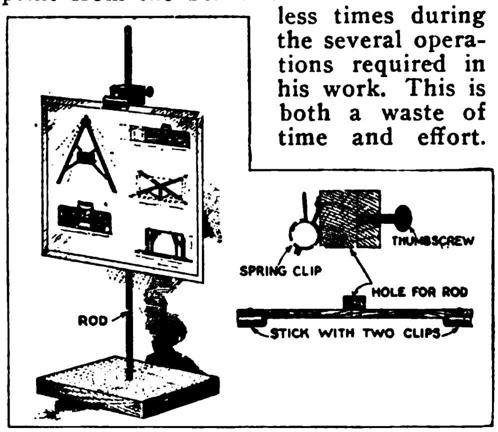
The Usefulness of the Shaper is Enlarged by Providing It with a Hacksaw Frame

A Bench Hoist or Crane

A simple hoisting rig, or bench crane, is easily made of iron pipe, and two pieces of iron bar. One piece of pipe is used for the column, or upright, and its top end is flattened for a length of about 2 in. A diagonal slot is drilled and filed in the pipe 1½ ft. below the top, for the brace, which is bolted to the pipe and to the iron boom. The lower end of the pipe has a piece of round stock riveted into it, and the lower end of this piece is made ball-shaped to act as a pivot. A block of wood, with a dished iron plate secured to it, is used under the foot of the crane as a bearing. The pipe passes through the bench, which helps support it.—C. H. Willey, Concord, N. H.



Blueprint Holder for Machinists



A Blueprint Holder near the Machine Helps a Machinist to Do Accurate Work with the Least Effort

A machinist often has to turn to a blueprint from the bench or machine countless times during the several operations required in his work. This is both a waste of time and effort. The blueprint holder shown in the sketch will hold the print constantly before him so he can read it while standing naturally at his machine. It is easily made from odds and ends to be picked up about the shop.

Mount a piece of 3/16 or 1/4-in. round iron rod, about 3 in. long, vertically in a block of hard, heavy wood, sufficiently large to support it steadily, by first drilling a hole in the block slightly smaller than the rod, and then threading one end of the rod into it. Next, cut a block, about 2 in. square, out of hard wood, and drill a hole through its center, slightly larger than the rod. Then, through one side, at right angles to the hole, insert a thumbscrew, and opposite it fasten a strong spring paper clip of the type shown. Turn out a similar block, but screw a stout stick about 2 ft. long to it, each end bearing a spring clip. The block bearing the single clip will accommodate small sketches, while the stick having two clips on it can be slipped into place when larger drawings are to be read. By means of the thumbscrew, the blocks can be raised or lowered upon the rod to the desired height, and held firmly in place. If it is desired to secure the stand upon the machine upon which the work is to be done, tap a hole in the machine bed, into which the threaded end of the rod may be screwed.—L. B. Robbins, Harwich, Mass.

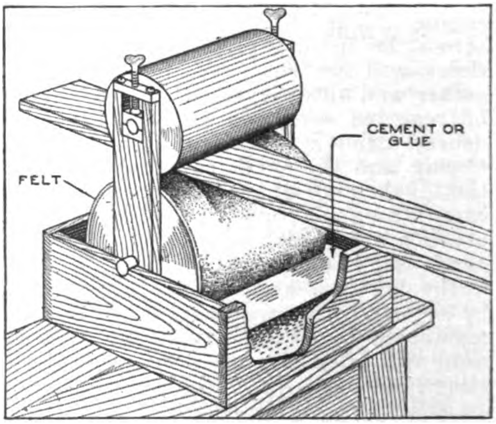
ℭA hacksaw blade can be fitted into a frame which is too long for it, by bending a long nail so as to hook into the hole of the blade and fasten it to the handle end.

Feeding Liquid Fertilizers

It is always a difficult matter to make sure that liquid fertilizers fed to a plant really reach the roots. Much of the solution is lost because it spreads over a wide area of the top soil. This trouble is avoided by the simple method of sinking an ordinary flowerpot close to the stem of the plant. It should be plunged in right up to the rim, in such position that the hole at the lower part is nearly in contact with the roots. When it is desired to apply the fertilizer, the solution is simply poured into the pot, and allowed to soak away slowly through the hole. Plants treated in this way show a marked improvement over those dealt with in the ordinary manner, which is really wasteful of the fertilizer.

Device Applies Glue or Cement to Long Boards

An easily constructed fixture, for applying glue or cement to one side only of long strips of wood, can be made as shown in the sketch. A small metal-lined container is made, with two uprights projecting in the center to form supporting bearings for two rollers. The lower roller is made of wood, with felt fastened to its outer surface; the upper roller is also of wood, but can be adjusted up and down in the uprights so that different thicknesses of board may be used. The adhesive substance is picked up by the lower roller and carried on the felt, so that a board running between the two rollers will receive the cement on its underside, as the lower roller rolls on it. At the



One Side of a Long Strip is Covered Evenly with Glue by Passing It between the Rollers same time, the roller dips into the cement, which provides a sure supply to the boards as they are pushed through. As the two rollers do not touch when they are not in operation, no glue reaches the other side of the board. The upper roller supplies just sufficient pressure to squeeze the glue out of the felt as the board goes over the lower roller.

Perforated Pail Sprinkles Insect Powder

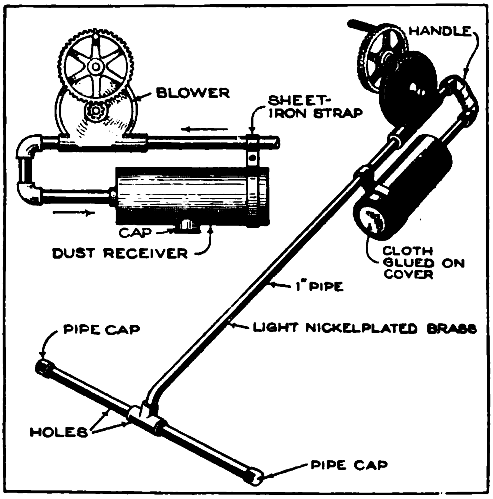
Florists or gardeners who have a large number of plants which must be sprinkled with "slug shot," or other insect powder, will find use for an ordinary tin pail with a lid, and with numerous small holes punched in the bottom. The pail makes the task of shaking the powder over the plants a light one.

To Recover a Lost Faucet Screw

It may happen sometimes that the machine screw from the underside of the valve stem in a faucet works loose, and drops down a straight length of water pipe. It may be recovered in this way: First shut off the water pressure, then remove the valve stem; plug up the inside of the spout with waste, and cover the upper open end of the faucet with a glass tumbler. Now, by having some one turn the water on and off quickly a few times with a fairly good pressure, the lost screw will be forced up the pipe and out through the top opening covered by the tumbler, thence falling into the basin, which should first be stopped at the outlet.—Fred Schimke, Hartford, Conn.

A Suction Carpet Cleaner

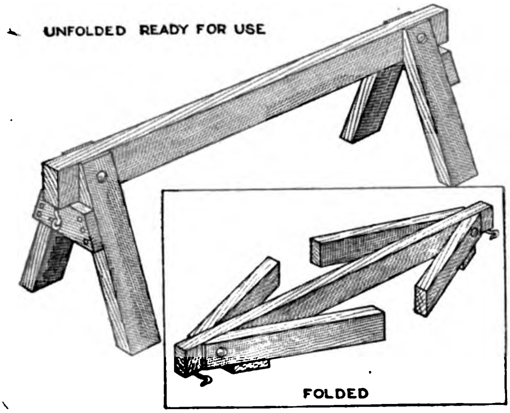
A blower such as used in small forges, some pipe and fittings, a tin can, and an iron strap are the materials used for making the suction cleaner illustrated. The size of the pipe to be used will be determined by the dimensions of the blower. The best kind of pipe to use is light brass plumbing-fixture pipe. The two pieces inserted in the tee at the bottom should be perforated with a number of small holes, large enough to receive the dust drawn in by the suction from the blower. Care must be taken to mount the blower in the proper direction so that it will force the air upward rather than downward. The dust catcher may be a tin can of suitable size, the cover of which should have a large hole made in it, covered with cloth glued around the edges. This permits the air to escape after discharging its dust in the can.



A Homemade Suction Cleaner Makes Use of a Hand Blower Such as Used on Light Forges

A Folding Sawhorse

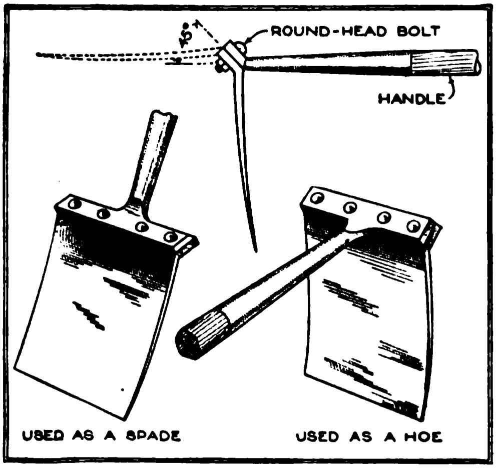
The sawhorse illustrated folds up flat, so that it can be stored in a small space. The thickness, when folded, is but little more than the width of the stock used in making the horse, which can, of course, be from 2 to 6 in. or more, depending on the size and strength desired. Screen-door hooks at each end keep the legs from folding up while in use, and give rigidity to the sawhorse—C. A. Black, Jr., Hightstown, N. J.



The Four Legs of the Sawhorse Fold Up on Unfastening the Two Hooks in the Ends

A Combination Hoe and Spade

The illustration shows a tool which can be changed from a good strong hoe into an equally stiff spade by removing four bolts and replacing them. In this way, the one tool will serve the purpose of both, especially when one of the tools is needed only occasionally.—Violet Johnson, Rockford, Ill.



Removing the Four Bolts and Reversing the Blade Converts the Garden Spade into a Hoe

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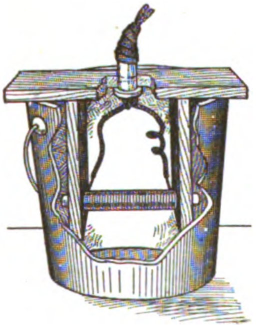
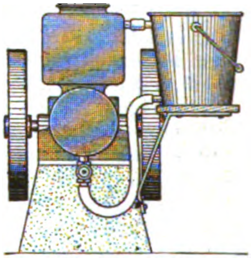
Engine Oil Heated before Pouring



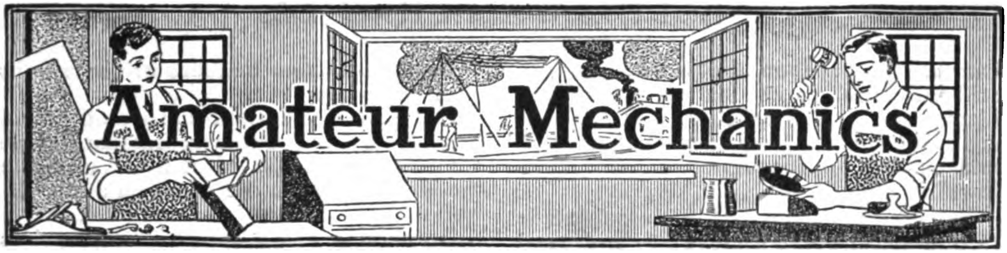
In cold weather, lubricating oil, especially that for air-cooled engines, becomes too thick to pour easily. Even when kept in a heated garage, the cement floor upon which the container usually rests is cold enough to keep the oil thick. The heater shown in the sketch will enable the motorcyclist or airman to pour the oil easily. A short piece of board rests across the top of the pail in which the oil is to be kept. To the underside of this board are nailed two short pieces extending nearly to the bottom of the pail. A 200-watt enameled resistance coil is slipped onto a long porcelain tube, which is supported about 3 in. above the bottom of the pail by the two wooden pieces. The terminals of this coil are connected to a lamp cord which is inserted through a piece of porcelain tube, knotted and wrapped with tape on the tube to keep it in place. It should be provided with a plug at the end, for connecting to the lighting circuit. The 200-watt coil will heat a pail of lubricant from 32° F. to 100° F. in about one-half hour. If the enameled heater coil cannot be easily obtained, a coil which will serve the purpose as well can be made by winding 12 ft. of No. 36 gauge nickel-silver ("German silver") wire upon the porcelain tube. Each turn must be spaced so as not to touch any other turn. Such a heater will be found very useful in a large garage.—J. G. Zimmerman, Milwaukee, Wis.

Hopper-Cooled Gas Engine Provided with Circulating System



When a hopper-cooled gas engine is run under heavy load for long periods, especially indoors, in the summer, it fails to give adequate cooling, and the water soon boils away. Since running the engine without water would soon ruin it, some one must be on hand to watch the water supply. A much better way, both from the standpoint of efficient cooling, and that of having to watch the engine, is to provide a circulating system. A large pail, or other receptacle, is provided with short lengths of pipe at both top and bottom. The hopper of the engine is also fitted with a short length of pipe at the top. The two pieces of pipe, one at the top of the pail, the other at the top of the hopper, are connected with a piece of rubber hose. Another piece of hose connects the drain cock on the engine with the pipe at the bottom of the pail. When the pail is filled with water, the drain cock opened, and the engine running, there is a continuous circulation of water which prevents the water from vaporizing so rapidly, and therefore the system does not have to be filled as often as if the hopper were used alone.

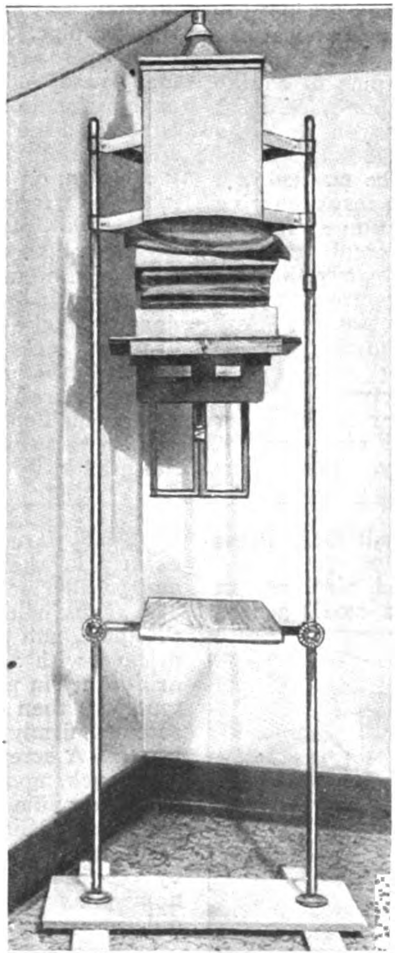
¶Several yards of asbestos paper wrapped around the hot-water tank and bound with a steel wire will keep the water hot for use at night, and sometimes even in the early morning.



An Upright Enlarging Camera

By ARTHUR F. SMITH

WHERE a limited floor space in the dark room is available for an enlarging camera, an upright machine will be found the most practical. The type shown here can be operated like any printing box, while in a sitting posture. Its construction is simple, and the material used in its making are, with the exception of the electrical attachments, discarded parts of something else. It is made up of a few feet of old 1-in. pipe, some boards, nails, bolts, a bit of black cloth, two valve wheels, a piece of cardboard, an old pair of lenses, a bread board, a small auto-headlight reflector, an electric-lamp socket, and a few feet of cord.


An Upright Enlarging Camera Is Compact, Convenient in Use, and Easy to Make from Cheap Materials

The frame, or standard, consists of the two long pipes, which are set upright, and fastened at the base to the board platform by means of floor flanges. At the top of the standard are hung the light box and camera. These are fastened to the standard by four strips of galvanized iron, 1 in. in width, bent around the pipe and screwed at the ends to the corners of the box. Bolts are placed through the strips as near the pipe as possible. When these are tightened they hold the box in place, and when loosened, the box can be changed to a higher or lower position. In the top of the box the reflector is placed; if a long-necked nitrogen or argon-filled lamp is used, a cone or tube should be set above the reflector, to support the socket and keep the filament well to the back of the reflector. This can be made from tin, brass, or any material available. The inside of the box is given a coat of white paint, or silver enamel, such as used on steam radiators. At the bottom of the box is a slot where a cardboard frame is inserted, which holds the negative. A ground glass should be placed on the upper side of the negative plate; if a film is used, place it between a ground glass and a clear glass, with the ground glass on top. This distributes the rays of light more evenly over the negative. A piece of black cloth is tacked over the slot, and dropped down over it while the exposure is being made, to keep the light from escaping. At the bottom of the box the lenses are mounted. An ordinary camera can be used here, or lenses can be mounted permanently. If the latter arrangement is used, all that one needs to buy is a pair of secondhand lenses; the rest is merely a box with black-cloth sides, open at the light end. An opening only large enough to insert the lens is necessary at the lower end. This camera, or lens mounting, slides up and down on a frame or track, in order to get the correct focus. A thumbscrew or bolt is used to hold the camera in place on the track. Several stiff wire squares can be put around the black cloth, and attached to it at the four corners; this will keep it from sagging in and cutting off the light while the "bellows" is relaxed.

Below the camera is the easel, made from a bread board attached to a piece of pipe by two wood screws through the pipe. The pipe is attached to the standard by two tees, larger than the long pipes, so that they will slide up and down freely. Through one side of each tee a hole is drilled and threaded, and in it works a stove bolt of the same size, which is soldered onto a valve wheel. When these setscrews are tightened against the upright pipes, they hold the easel at the proper elevation. As the printing paper lies flat on this table, no pins or thumb tacks are needed. The paper is held flat by laying a piece of glass on it. If a border is desired on pictures, pieces of glass varying in size can be masked and placed over the paper. To insure getting the paper in the same location each time, the board is laid off for different-sized pictures, and holes are made partly through the board where small pegs are placed to hold the paper and glass in position. Any number of pictures can be made from one negative without moving these pegs. When a different-size picture is to be made, the pins are set over in the other holes, and the paper and glass can be dropped into place quickly. These pegs can be made from matches or short nails with heads removed.

If a picture is desired that would be too large for the board to accommodate, place a mirror on the board at a 45° angle to the lens, and place the paper on a near-by wall.

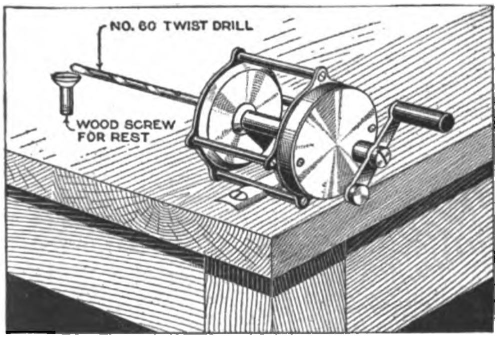
Developing trays for the large prints can be made at a very small expense. Wooden boxes, about 3 in. deep, are used, white oilcloth being tacked to the rim of the box, and pressed down inside. These will last a long time.

During the several hours usually required for drying large prints, they will often curl up. The drier used with this machine was made out of a 3-ft. length of furnace pipe. Several yards of corrugated paper were secured from a store, also as many yards of cheesecloth. The cloth and paper were basted together along the edges, and the pipe was rolled up in them, with the cloth on the outside. Place prints, face down, on the cloth, wrap some newspaper or wrapping paper and some string around the roll outside of the prints, and set the roll on end above a small oil stove. In a few minutes, the prints can be removed both dry and straight. This drier does not take up as much space as the ordinary racks, and a large number of prints can be handled in a very short time.

This entire finishing outfit was made at a very small cost, and any amateur should be able to secure and assemble the material used in its construction.

Fish-Rod Reel Forms Small Drill Press

While building a model airplane, an amateur mechanic used a small geared drill press, made from a cheap 40-yd. multiplying fishing-rod reel. The oil cup was removed from the end opposite the crank, and a hole drilled in the end of the spool shaft with a No. 60 twist drill, to a depth of 3/8 in. Care was taken to get this hole exactly in the center of the shaft end, and parallel with the length of the shaft. The shank of the drill was then placed in this hole, and the soft brass of the shaft pricked with a center punch to hold the drill firmly in place. Each end of the reel tang was then drilled, so that it could be screwed firmly to the top of the workbench. A screw was sunk part way into the bench, upon which to rest the piece of wood while boring with the miniature drill press. Since the reel cost less than $1 in the first place, and was not harmed by the change made, the drill was economical as well as efficient.—Jack D. Bardill, Brooklyn, N. Y.



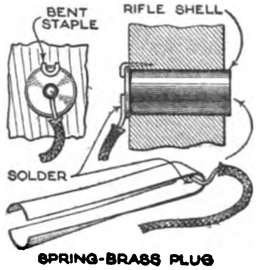
A 40-Yard Multiplying Fishing Reel Makes a Cheap Drill Press for Small Work

Cleaning Stained Marble

Marks on marble detract very much from its appearance. Many of these, owing to their greasy nature, will not yield to ordinary washing with soap and water. All stains may be easily removed if the marble is washed with a weak solution of oxalic acid and water, about a teaspoonful to a pint. A stronger solution may be used in the case of very deep stains, but on no account must it be allowed to remain for more than a few minutes on the marble, or it will eat into the surface. The polish may be taken away by the cleaning process, but it can be rapidly restored by mixing powdered pumice stone and vinegar, and rubbing it on the surface. Leave it on for a short time, and then wash with plain water. Finally, wipe the marble quite dry and rub briskly with whiting, and a piece of chamois skin. A beautiful polish can be quickly secured by this method on any marble surface.

Cartridges Make Simple Switchboard

A switchboard of the plug-in type can be readily made by the amateur from a number of rifle cartridge shells of the same size. These are sawed off at the open end to a length slightly greater than the thickness of the plug board. Holes of the proper size are drilled in the board, the shells are inserted, and fastened by driving a staple beside each and bending it over, as shown. A wire soldered to the rear end of each cell provides the electrical connection to it. The plug used is made from a single strip of spring brass, by bending it to the shape indicated, and soldering the cord to the strip at the bend. Such a switchboard provides a very handy means of connecting any two of a large number of circuits.—F. H. Sweet, Waynesboro, Va.



Adhesive Plaster Makes Good Ends for Shoestrings

When the metal ends come off from shoestrings, it is not necessary to throw the string away or spend much time making new ends from pieces of metal. A quicker and very satisfactory way is to use a small piece of adhesive plaster, rolled around the end of the string, and heated slightly, if convenient, to insure that it will not come loose.—Henry E. Lynch, Montreal, Can.

Catching Poultry with a Net

It is almost impossible to catch one out of a flock of chickens by ordinary means without creating a commotion which has a bad effect on the flock and which is likely to disturb the neighbors. The poultry net shown in the photograph makes the process a much easier one. A ring, 15 in. in diameter, is formed from $\frac{3}{8}$-in. iron rod and fastened to a long handle. A net of cheesecloth, or of the regular woven variety, is fastened to this ring. To catch the fowl it is only necessary to walk quietly among the flock until the fowl to be caught is singled out. A quick flop of the net catches the fowl without exciting the flock, as the usual prolonged chase would do.—Fred Telford, Chicago, Ill.

Fowls may be Caught without Disturbing the Flock by Using a Poultry Net

Seedlings Watched While Growing

In many schools, teachers show their pupils how a seed germinates and grows, as part of their nature study. One way in which this is done is to use a glass fruit jar, as shown in the photograph. The jar is first lined with blotting paper. The space inside the jar is then filled with sawdust. The seeds to be watched are placed between the blotting paper and the glass. By keeping the sawdust wet, the seeds germinate readily and can be examined through the glass at any stage of their growth. They should be kept in a warm, sunny place.

How to Make Double Exposures

The Use of a Homemade Duplicator Makes It Possible to Take Pictures of a Man Playing Cards with Himself

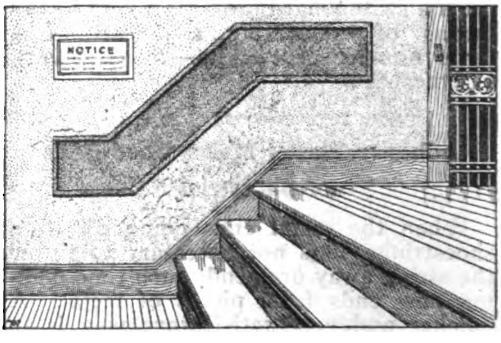
It is not uncommon at moving-picture shows to see an actor play two different parts on the screen at the same time. In spite of its seeming impossibility, almost any amateur photographer may make pictures of his friends playing games with themselves, as the old man in the photograph is doing, or even to have them shake hands with themselves. The trick is accomplished by what is called "double exposure," which means that two different pictures are taken on the same plate or section of film. The easiest way in which the amateur can take such pictures is to use a device called a duplicator, which can be made at home in a few minutes. If a film camera of the folding type is to be used, secure a small, round, pasteboard box, such as a pill box, just large enough to slip over the lens housing. Cut exactly half of the bottom from the box. To take the picture, set the camera on a solid base, and pose the person who is to do the acting on one side of a table, or other position, as selected. Then slip the duplicator over the lens, with the opening in the bottom of the pill box on the side of the lens opposite to that upon which the person is sitting. For example, if the sitter is on the right side of the table, the left side of the lens should be uncovered. Then make the normal exposure for the subject and distance, leaving the duplicator on the shutter. Then turn the duplicator so that the opposite side of the lens is covered, pose the sitter on the other side of the table, and take another picture without turning the film. If the work is properly done, the finished picture will show the sitter on both sides of the table, similar to the effect seen in the photograph printed here. Since the poses can be changed to suit the fancy of the photographer, there is no limit to the variety of pictures that may be made in this way. However, in taking such pictures as that of a man shaking hands with himself, it is extremely difficult to pose the picture so that the hands will meet exactly.

With a folding plate camera, the duplicator may be a piece of cardboard inserted in the back of the camera, between the bellows and the plate holder. It is used in the same way as the pill box.

Box cameras are used for double exposures by holding a piece of cardboard over half of the lens opening on the same side that the sitter is placed on. In any case, a great deal of amusement can be had by a careful camera owner, by asking people to pose for him in this way. It is also possible to pose different people on the same plate or film without their knowledge, much to their astonishment when the finished picture is seen.—S. R. Fass, Brooklyn, N. Y.

A Match Scratcher for the Shop Exit

Workmen, leaving the factory or shop at quitting time, almost invariably light a pipe or cigarette as they pass from the exit. While this gives them shelter from the wind, it also means that the walls near the door will be defaced by the striking of matches. A shop manager, realizing that he could not prevent this habit, had large strips of emery paper placed on the walls near the exits. These strips were approximately 18 in. wide and 10 ft. long, and were bordered by strips of varnished wood, as shown in the sketch. Needless to say, the workmen appreciated this convenience, and did all their match scratching on the emery cloth.—K. M. Coggeshall, Webster Groves, Mo.



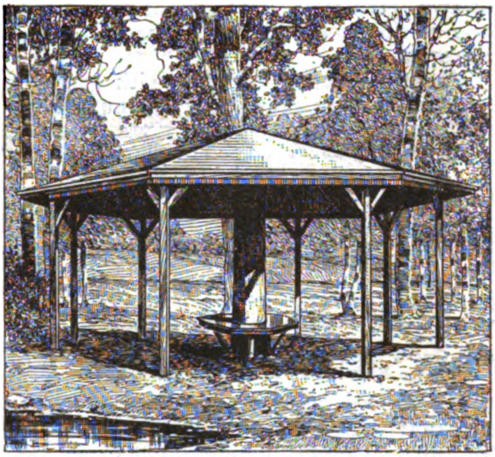
A Factory Match-Scratcher Panel Prevents Employes from Defacing the Walls on Their Way Out

Woodland Shelter House Built around Dead Tree Trunk

THERE is not much pleasure to be had in the woods if no shelter is near when rain threatens at any minute. Many picnics are broken up by showers which last but a few minutes, simply because there is no way to protect the food or to keep dry until the squall passes over. A shelter, such as illustrated, will take the discomfort out of walks and picnics, and will induce people to tempt the weather more often, since they know that protection is within easy reach.

A dead tree, the trunk of which is still quite sound, makes an excellent start for such a shelter. It should be cut off about 10 ft. from the ground, care being taken to make the saw cuts as even as possible. It may be necessary to erect scaffolding to make this cut properly. After the cut surface is worked smooth, eight rafters are fitted into the top of the trunk. The rafters are 12 ft. long, four of them being 2 by 4-in. timber, and four, 4 by 4-in. They are supported at the outer end by 4 by 4-in. posts, driven into the ground and extending 8 ft. above it. The 4 by 4-in. rafters should be fitted into the log first, the 2 by 4-in. being added later. Upon this framework, which forms an octagonal, umbrella-shaped structure, 7/8-in. boards are nailed to form the roof. This may be covered with shingles or some roofing material.

For greater comfort, a seat built around the trunk may be added, and other seats may be built near it. The whole structure should be finished in a dark, neutral brown, with just a touch of white trimming. If the roof is stained a moss-green, the color scheme will be in harmony during all seasons of the year, with the prevailing colors throughout the surrounding woods.—G. L. Meller, Fargo, North Dakota.


Picnickers Have Little Fear of Passing Rainstorms When a Substantial Shelter Is Near to Protect Clothing and Food

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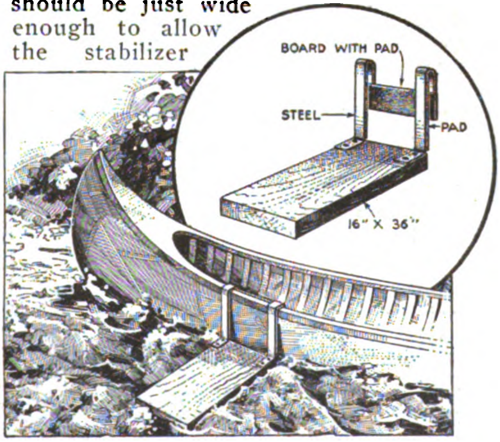
Quickly Adjusted Canoe Stabilizer

Fishing from a canoe is dangerous at best. This is especially true when trying to land a fighting bass, or other game fish. For use at such times, and also for safety when caught out in rough weather, stabilizers such as shown in the drawing are almost invaluable. Two floats, which can be quickly put on or taken off the canoe, will secure the desired stability in any but the roughest weather. Each float consists of a board, 36 in. long, 16 in. wide, and 2 in. thick. Two strips of strap iron, 2 in. wide and 3/16 in. thick, are heated and bent as shown in the sketch. These are bolted to the board, and another narrow board, which is padded with canvas or corrugated rubber, is fastened inside the loops of the strap iron. Other pads are fastened to the straps themselves, to protect the canoe from the rubbing of the straps while the stabilizer is in use. While fishing, or when paddling across rough water, the two floats are placed over the edges of the canoe on opposite sides and at opposite ends. The strap-iron loops should be just wide enough to allow the stabilizer to fit snugly to the gunwale of the canoe and thus hold firmly.



Floats, Padded to Protect the Sides of the Canoe, Give Stability in Rough Water or While Fishing

Laying Out a Tennis Court

By ROY BENHAM

ANY reasonably level vacant lot or other ground space, about 120 ft. long and half as wide, can be laid off into a tennis court, which will provide one of the best known forms of exercise, and certainly one of the most exciting games played in America.

If the ground is covered with grass of a good quality, this may be cut short, and a "grass court" formed. Such courts are sometimes preferred by beginners, but for the real game of tennis, all grass and weeds should be cleared from the ground, and may be kept off by the use of salt or some other chemical to prevent vegetation from growing. The dimensions of a tennis court are laid down in the official rules of the game, and the over-all dimensions are shown in Fig. 1. It thus appears that, on paper, the laying out of a tennis court is not a difficult proposition. But when one actually arrives on the ground and begins to locate the points of a court, it will be found that unless one is somewhat experienced in the work, the corners do not come out square and the lines do not all measure up as they should. There are, of course, many methods of going at the problem of laying out a court, but it is believed that the one here explained is as easy as any, and will enable any boy or girl to lay out a court in a few minutes. Some stout twine should be provided for measuring purposes, a tape measure several feet long, or a yardstick for laying out distances on this twine, 12 stakes for marking the corners of the court, two stout fence posts to hold the net, and material for the backstops, as described below.

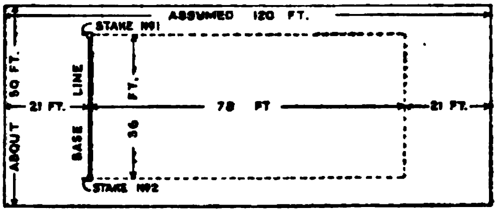


Fig. 1

Lay Out a Base Line 36 Feet Long, at Least 20 Feet from the End of the Lot

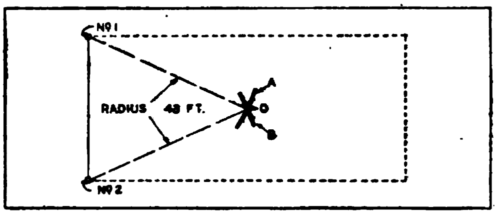


Fig. 2

Arcs Drawn at a 43-Foot Radius from the Ends of the Base Line Determine the Center of the Court

Beyond the base lines, or lines at the extreme ends of the court, there should be a space not less than 20 ft.; 30 ft. is much better for a fast game. If it is found that 120 ft. of ground is available for the court, then by subtracting 78 from 120, we find that 42 ft. of ground will be available at the ends or 21 ft. between each base line and the backstop. Therefore, lay out a line 21 ft. from one end, 36 ft. long, to form the base line at this end of the ground, as shown in Fig. 1. This base line will be marked by two stakes, Nos. 1 and 2, 36 ft. apart, and the tape or whitewash line, whichever is to be used to mark the lines of the court, may be stretched at once between the two stakes, or this may be left till later, as preferred.

A length should now be measured off on a string, 43 ft. long, with nails tied in the string at both ends of the 43-ft. length. (The radius may be made 42 ft. 11⅝ in., if great accuracy is desired, but this is not ordinarily necessary.) First, drive one of the two nails in stake No. 1, as indicated in Fig. 2, and scratch with the other nail an arc A, near the center of the court. Transfer the fixed nail from stake No. 1 to stake No. 2, and scratch, in a similar manner, arc B. The intersection of the arcs A and B is the center of the court. Drive a temporary stake at this center, which we will call point O, and transfer the fixed nail to it from stake No. 2. Carry the other nail to the neighborhood of stake No. 3, seen in Fig. 3; hold the line taut and sight across stake O to stake No. 2. When the nail is in line with stakes O and No. 2, make a mark for stake No. 3. In a similar manner, locate stake No. 4, by sighting across stake O to stake No. 1.

Now swing the cord around to the position OC, about halfway between stakes Nos. 1 and 2. Holding the end C of the cord in the left hand, move the right hand up on the cord, toward the line 1-2. Swinging from right to left and back again, find the point on the cord which marks the shortest distance from O to the line 1-2, and tie into the cord at this point, D, the nail formerly tied at the 43-ft. point, C. The length of cord OD will then be 39 ft. This distance can of course be laid off directly from the yardstick or tape, if preferred. Next, with one of the two nails set in stake No. 1, scratch the arc E, and similarly, from stake No. 2, draw arc F. It is best, before drawing these arcs, to draw the side lines of the court, 1-3 and 2-4. The arcs E and F will then be merely scratches across these lines, and a line joining them will pass through point O and will be the net line of the court. If two or more courts are being laid out side by side, all the base lines being in line with each other, it is not necessary to find points E and F by drawing arcs, as a line passing through all the center points O will be the net line for all the courts.

The principal work of laying out the court is now finished. As seen in the completed diagram, Fig. 4, a line from 3 to 4 will complete the outer boundary of the "double" court, and two other lines, 4½ ft. inside of the side lines 1-3 and 2-4 will form the boundaries of the "single" court.

Between these two single-court lines two service lines should be drawn at a distance of 18 ft. inside the base lines. Stakes, as indicated by Nos. 5, 6, 7, 8, 9, 10, 11, and 12, will be found very useful, although they would not be permitted to remain on a championship court; if the tape is torn, or marked lines obliterated by rain, they can be fixed again in a short time by using the stakes. If the stakes are used, they must not be allowed to project above ground; it is much better to have to hunt a few seconds for them after a rain has obliterated the markings, than to stumble over them during play. The backstops should be placed at the ends of the space, which was supposed in this case to be 120 ft. long, leaving 21 ft. at each end between the base line and the backstop. These backstops can be made from chicken netting and a few wooden posts. They should be from 10 to 20 ft. high, and 40 or 50 ft. wide, bending in towards the court at both ends.

Two heavy posts should be placed to take the ends of the net, 3 ft. beyond the double-court boundaries on the net line. These posts should stand about 4 ft. high from the ground, and should be set in the ground firmly enough so that the net can be stretched very tightly between them. It is better to buy a net than to try to make one, as homemade nets will probably be found rather unsatisfactory.

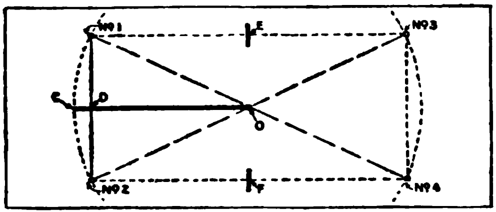


Fig. 3

The Other Two Corners of the Court are Located on a 43-Foot Circle from the Center

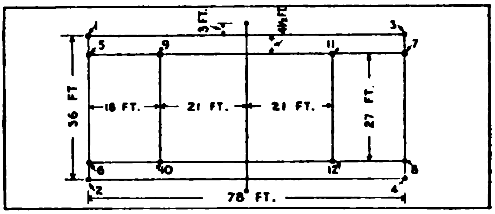


Fig. 4

The Completed Court will Have the Dimensions Laid Down in the Rules of Lawn Tennis

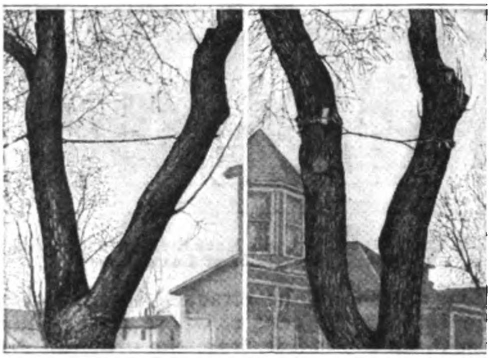
The net should be attached to the posts so that at the center, where it sags the most, its top is 3 ft. from the ground. At the sides of the court, it should be 6 in. higher than this. In attaching the net to the posts, it must be borne in mind that the net will stretch during the course of play, and at least until it becomes thoroughly stretched it must be adjusted every little while by tightening at the posts. A good way, therefore, is to have the rope through the top of the net long enough so that it can be merely wrapped around the top of the post several times, without being tied, and will be held by friction only. When the net becomes loose, it is only necessary to unwrap the ends of this rope from the post, pull it to the proper tightness, and again wrap it around the post.

No attempt will be made here to tell how to play the game of tennis, as this is quite well known, and can be found in a great number of books. All players should provide themselves with copies of the official rules, which can be obtained at sporting-goods stores or hardware stores for a few cents. Only after one has become interested in the game, and acquired some little proficiency will he appreciate the advantage of a well laid-out and constructed court.

Kewpie Dolls Hold Talcum Powder

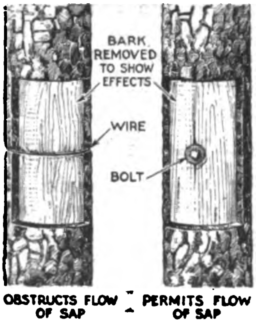
A novel holder for talcum powder is made from a kewpie doll by punching small holes with a pin in the doll's head, through which the powder is sprinkled. A larger hole is cut in the doll's back through which it is filled with powder. The hole for filling may be covered either with a piece of adhesive plaster or by a ribbon tied around the doll.—Mrs. A. Pearl McPherson, Flagstaff, Ariz.

Bracing a Tree Limb



At the Left, Right Way, and at the Right, Wrong Way of Tying Two Limbs Together

Frequently the symmetry of a tree can be preserved by properly bracing a limb that has been partly broken, or one that threatens to break off. Since the vital fluids of a tree circulate in and near to the cambium layer, which lies just underneath the bark, a wire or iron band around a trunk or branch tends to cut through the bark, and, finally, through this cambium layer, thus damming the flow of the sap in the tree. A bolt run through a limb or trunk pierces the cambium layer in only two small areas, which interferes with the movement of the sap to such a slight extent as to be entirely negligible. A snug-fitting bolt, with a washer for a bearing, will support the weight of a branch as well as a band encircling it. Connecting two bolts set in different branches will throw the weight of one branch onto the other, and still allow plenty of play for the swaying of the branches in the wind. Because of this swaying, wherever the distance is enough to allow for three or more links, a chain ought to be used. Sometimes conditions make it desirable to brace a limb by chaining it to two or more other limbs. A small block and tackle will make it possible to pull two branches together when putting the chain in place, so that when released to their natural position, the chain will be tight.

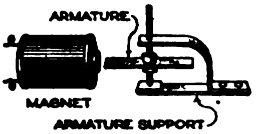


The photograph shows a repair made on a large ash, which was badly wrecked in a windstorm. Its location was such as to make it very desirable to save the tree, rather than wait until another had grown to take its place. The cleft at the fork, caused by the tearing apart of the large branches, extended down into the trunk. With block and tackle, the heavy branches were pulled back toward each other, and held securely in position while the work was going on. Two large bolts, placed through the trunk, brought the sides of the cleft together, and held the parts firmly in place. The wood, of course, was sound. A small groove was cut at the base of the cleft, so that any water that might tend to collect in the hollow would run off quickly. The two limbs were then chained together as shown. The tree, thus repaired, has since passed unharmed through a number of windstorms as severe as the one that wrecked it.

A Toy Synchronous Motor

A toy motor, which runs on alternating current from a small transformer, will give much pleasure to the boy who makes it. The speed of such a motor depends upon the rapidity at which the current alternates, since it is of the synchronous type, that is, of the type of motor which "keeps step" with the alternations of the current.

The armature, or moving part of this motor, is a piece of clock spring, or other hard steel, 2 in. long. A hole is punched exactly in the center for the shaft, which is a large needle. The armature is held tightly between two pencil erasers slipped over the ends of the needle. The armature support is made from sheet brass, or other nonmagnetic metal, bent to the shape shown in the sketch. A hole for the needle is drilled through the upper arm and through one thickness of the lower arm. A small, thin piece of glass is placed between the two thicknesses of metal, where the lower arm is folded over, for the needle point to rest on. This makes a very good bearing.



A magnet such as found on bells and buzzers may be used for the motor. It should be fastened to the motor base so that the center of the magnet core is a little above the level of the armature and about ⅛ in. from its end.

When the motor is assembled, turn on

the current. Then give the armature a whirl by spinning the needle between the thumb and finger. It may take several trials to learn just the proper speed required. After the motor once starts, it will run at a steady speed, unless too much load is put on it, or the current is cut off for an instant.

The only cause likely to interfere with the running of such a motor is that the magnetism of the coil might be so strong as to demagnetize the armature, rather than to turn it end for end. If the motor shows a tendency to run a while and then stop, use a weaker current, or separate the magnet farther from the armature.

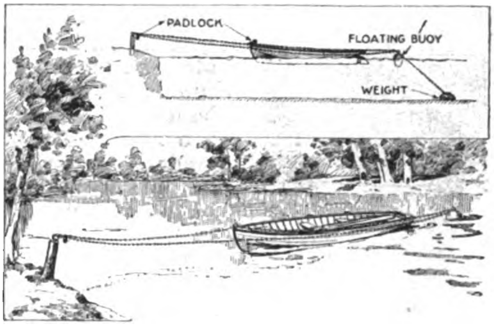
After considerable practice, the owner will learn to run the motor at any one of two or three different speeds by giving the armature the proper whirl in starting it. All of these speeds are in step with the alternations of the current.—H. J. D., Chicago, Ill.

To Photograph Fire Scenes

To photograph fire scenes in daylight is not a difficult task and there is no danger attached to the feat. A one-fiftieth of a second exposure at stop F.11 (U. S. 8) is sufficient at a distance of over 25 yd., provided the sun is shining on the subject. This will include all smoke clouds and details back of the scene. No smoke should come between the camera lens and subject. Without direct sun, use about one-twenty-fifth of a second at stop F.8 (U. S. 4). A huge conflagration in the night, while awe-inspiring and weird, does not lend itself readily to photography, and a silhouette picture of the flame itself, outlined against the blackness of the night, is the only thing possible, with one-twenty-fifth of a second exposure at stop 16—the largest stop on a fixed-focus, or box camera. The latter rule applies to all snapshots of fire scenes with fixed-focus cameras.

Mooring and Locking a Boat Away from Shore

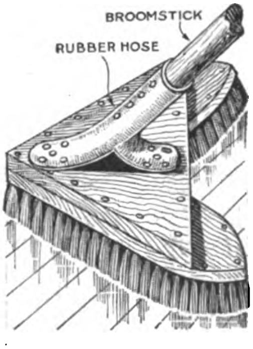
The sketch shows a method of mooring and locking a boat at a safe distance from the shore. A post is driven into the ground on shore and fitted at the top with a large iron ring. At some distance from the shore, a floating buoy is anchored with a chain to a rock which rests on the bottom. This buoy has a short post fitted with a large iron ring, similar to that on the other post. A length of chain is threaded through both rings, and the ends fastened firmly together, thus forming an endless chain through the two rings. A third iron ring is fastened to the bow of the boat. Two padlocks will be required. When landing from the boat, fasten any link of the chain, with one of the padlocks, to the ring on the bow of the boat; then pull on the chain so as to move the boat away from shore and near the floating buoy. Then fasten the other padlock through the ring on the shore post and also through a link of the chain, so as to lock the chain at that end. The boat is thus held away from the shore, and cannot be pulled in until the padlock is removed.



A Boat Moored and Locked at a Distance from the Shore cannot be Readily Stolen

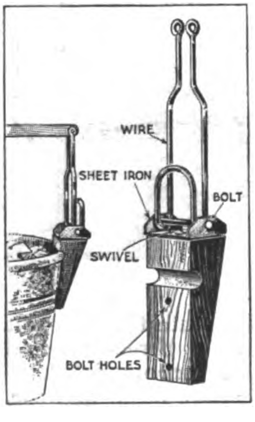
A Flexible-Handle Scrubbing Brush

Many backaches may be saved by furnishing the housewife with a flexible-handle scrubbing brush, which will reach into corners, the combination making it unnecessary to stoop, or to go down on the knees, thus taking a great deal of hardship out of her day's work. Two hand-scrubbing brushes cut to fit together at an angle, a little more acute than a right angle, are screwed to a three-cornered piece of ½-in. wood. A broomstick handle is slipped into a short piece of hose, which is split at the other end, and fastened to the triangular piece, and to the handle, with tacks. The result is a flexible brush that will make a hard task much easier.



A Homemade Washing Machine

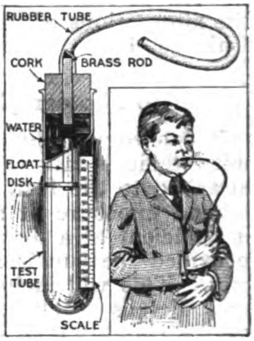
A very good washing machine can be made from an ordinary washtub, and a washer of the type which resembles an inverted funnel on a long handle. A hardwood handle is made, $1\frac{1}{2}$ by $2\frac{1}{2}$ in. by 3 ft. A $\frac{5}{16}$-in. hole is drilled in this, 1 ft. from the end, and a heavy strap of galvanized iron, having a $\frac{5}{16}$-in. hole in the center, is bolted to the stick so that the two holes are in line with each other. Several $\frac{5}{16}$-in. holes, bored on the handle of the washer, will make it possible to adjust its height as required. A piece of sheet iron is cut and drilled as shown in the sketch, and is fastened by a screw, at its center, to the top of a small tapered hardwood block, so that it will turn easily. The washer can thus be turned to reach all parts of the tub. The ends of the sheet-iron strip are bent up, and a small bolt inserted in the holes. The block is then bolted to the edge of the tub. A piece of heavy wire, bent as shown in the drawing, is bolted to the end of the 3-ft. stick, and hooks under the bolt on the swivel block.



With the tub about two-thirds full of clothes and hot soapy water, the hardwood handle is worked up and down, while the handle of the washer is held to guide it to all parts of the tub. Every part of the tub can be reached, and the clothes thoroughly washed by having the hot soapy water forced through them. The handle may be adjusted, so that a person of almost any height can use the washing machine without having to bend over the work. The machine can be taken apart by merely unhooking the wire from the bolt on the swivel block, and taking out the bolt that holds the washer under the strap on the hardwood handle. In this way, it can be easily stored away in a very little space. It is easily made, easily used, and costs very little.—E. K. Wehry, Cedar Rapids, Ia.

A Trick Breath Tester

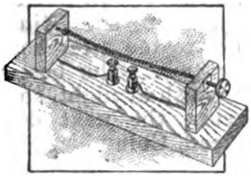
A great deal of fun can be had by the owner of a trick breath tester. The instrument consists of a large test tube filled with water. In this is placed a smaller closed-end tube, which is inverted and slipped into the large tube, thus leaving enough air in the upper end of the small tube to float it in the water of the large tube. It is kept in the center of the large tube by a pasteboard disk, soaked in melted paraffin or candle wax, and fastened around the bottom of the small tube with some of the wax. Holes cut in this disk enable the water to pass through it when the float moves up and down. The large test tube is closed by a cork, through which a short length of glass rod has been passed. This rod forms a "fake" tube, and over it is slipped the rubber tube, through which the victim is to blow. When the cork is put into the large tube, the buoyancy of the small tube can be regulated by putting the cork in tightly or pulling it out somewhat, as necessary. It should be so adjusted that, when the sides of the large tube are pressed, the small tube, or float, will sink to the bottom of the large tube. When the cork has been so adjusted, it should be sealed in place with thick shellac or sealing wax. To complete the deceptive appearance of the tester, a paper scale should be made and pasted to the outside of the tube. When the victim is asked to test his breath, he blows into the rubber tube as hard as possible, but, in spite of his exertions, the float remains stationary at the top of the scale. The owner then takes the tester, and while apparently using it in the same manner as his victim, gently presses the side of the larger test tube, at the same time blowing into the rubber tube. This causes the float to sink



to the bottom of the scale, to the surprise of the victim, who does not know of the fact that the other person is using pressure on the tube.

A Simple Chain Rheostat

The rheostat shown in the sketch is based on the effect of tension between the links on the passage of electrical currents. By tightening the chain, more current will flow, and by loosening it the flow is reduced. The device is useful for reducing current in small electrical apparatus. The chain is mounted between a hook and a nut which works on an adjustable thumbscrew set into a small brass plate. It is about 6 in. long, and the hook and thumbscrew are connected to binding posts on the base.—William Warnecke, Jr., New York City.

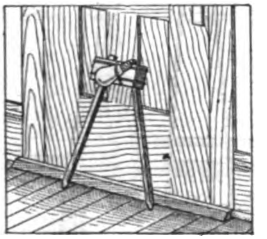


Lawn Scraper Made from a Rake and a Barrel Stave

A scraper for grading lawns is quickly made by wedging a barrel stave between the end teeth of a garden rake. When needed at short notice, or for a few minutes only, this will provide an efficient scraper.

Breaking Lamp Bulb Warns of Burglar

A very efficient burglar alarm can be made from a burned-out electric-light bulb, because of the noise it makes when broken. Fasten two legs to a brick, and lean it against the door. Tie the light bulb to the side of the brick. When the door is opened the brick falls over on the bulb, breaking it, frightening the invader, and arousing the household. Care should be taken to have the legs far enough apart at the bottom so that the brick will not fall over on a side other than that to which the bulb is fastened.—Leon D. Gray, E. St. Louis, Illinois.

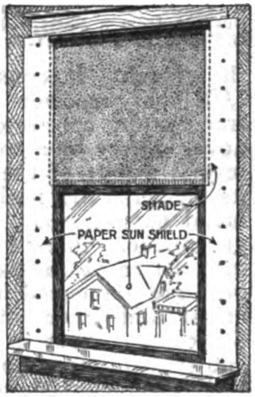


A Spreading Flower Box

A flower box with the side covered by vines presents an attractive appearance. Such a box is easily made by boring large holes in the side of the box and planting vines in the dirt inside of these holes, taking care to leave the foliage all on the outside while setting the roots deep into the soil. If planted with Vinca or Wandering Jew vines, which grow very rapidly, the box will be entirely hidden in a very short time.—C. A. Black, Jr., Hightstown, N. J.

Shade Eliminates Annoying Sunbeams from Workroom

In the early morning and toward evening, much trouble is experienced in drafting rooms and workshops from the direct rays of the sun shining upon the bench or drafting table. With the ordinary type of window shade, the trouble cannot be eliminated entirely, as there are spaces at the side of the window through which narrow beams of light come in, and these are particularly troublesome. In one drafting room this trouble was entirely eliminated by tacking strips of stiff paper on the window casing at both sides, so that the shade is kept from blowing inward and, at the same time, the light which might come past the edges of the shade is completely cut off. In the case of double windows, one wide strip between the two windows will take the place of two strips. The hint is a valuable one also in laying out plans for new drafting rooms or shops, as a construction similar to this could easily be provided in order to avoid permanently the trouble from direct sunlight.



Trees Form Battery and Ground in Novel Telephone Line

A telephone which can be used by hunters, campers, or surveying parties, and which has unusual features, is shown in the sketch. It consists of an ordinary 1,000-ohm receiver and a microphone transmitter, connected in series with a novel battery by a copper wire. The battery is a part of the ground circuit, and its elements are nothing more than two metal pins or rods; one copper and the other zinc. One of these pins is driven into a tree at each end of the line, and both are connected in series with the receiver and transmitter by copper wire. Sufficient current to operate the receiver and transmitter is obtained from the battery, formed of these two unlike metals and the sap of the trees into which the pins are driven. When so desired, the outfit may be used as a telegraph, the make and break of the key being heard in the telephone receivers. Since it is possible to extend the one wire by merely looping it over boughs of the trees, this telephone system may be used over quite an extensive territory—Frank Sahlmann, Manhattan, Kan.

A Practical Telephone for Use in the Woods Receives Current from a Battery Made by Driving Copper and Zinc Pins into Trees at Each End of the Line

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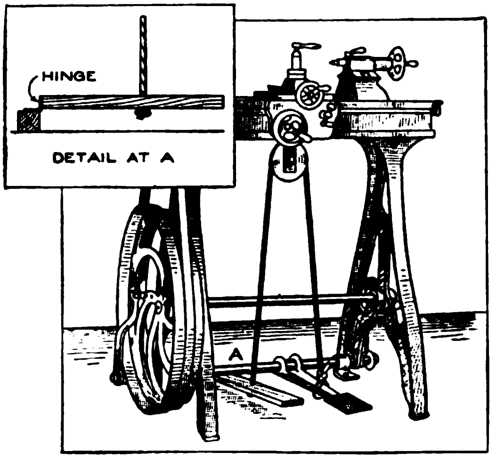
℄Where gasoline lines on cars are likely to chafe, wrap a piece of inner-tube rubber around the tube several times, and fasten with wire.

Preserving Shoe Soles with Copal Varnish

Shoe soles may be made to wear for longer periods without repair being necessary, if they are given a coat of varnish before wearing, and again at intervals of from two weeks to a month. Varnish made of copal has been found very satisfactory. The varnishing is a great deal cheaper than having the shoes resoled, and serves to put off the need of such a repair for some time. New shoes should be treated after having been worn a day or two. The best way is to apply the varnish at night, so that the shoes may be worn the next day.—William T. Grinstead, Columbia, Mo.

Improving a Foot-Power Lathe

Many foot-power lathes have only one pedal, giving one impulse to each revolution of the driving wheel. This can easily be improved by adding another pedal, as shown in the sketch. A pulley is fastened underneath the lathe bed, directly above the regular pedal and the one to be added. The new pedal may be a piece of hard wood, 3 in. wide by 1 in. thick, and as long as the original one. It is fastened at the back of the lathe, to a hinge on a block which has been screwed to the floor. A strong, lightweight rope is then fastened to the new pedal, strung over the pulley, and brought down to the iron pedal and fastened. The iron pedal should be in a position halfway between the extreme upper and



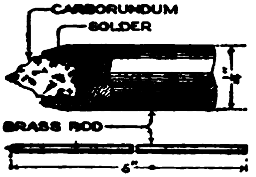
The Addition of an Extra Pedal to a Foot-Power Lathe Provides for Two Power Impulses per Revolution Instead of the One

the lower point, while the wooden one is at the same height. This addition gives a walking motion to the operation, the same as the two-crank foot-power machines. have.—Edwin J. Backman, Fullerton, Pa.

Broom Stiffened with Piece from Inner Tube

Brooms, especially the cheaper grades, give trouble by spreading out and thus becoming useless. They may be made stiffer by forcing a wide band, cut from a rubber inner tube, over the upper part of the straw. This may be slipped up or down to suit the requirements of the work, making the broom stiff or not, as necessary.

A Tool for Scratching Glass



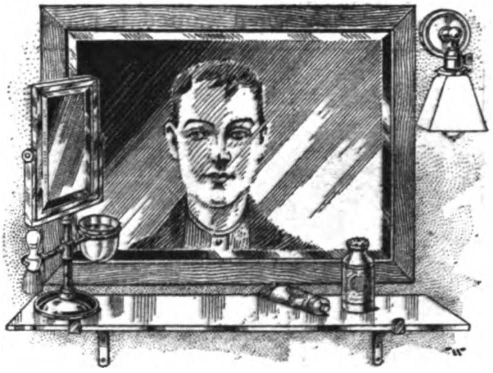
A very serviceable cutting, or scratching, tool for glass can be made in the following manner: Cut a rod of iron or brass, about ¼ in. in diameter, to a length of about 5 in. File one end flat, and drill a hole in the end, somewhat less than the diameter of the rod, and of a depth about equal to the diameter. Then procure some carborundum crystals, such as are used in wireless-telegraph detectors, and break off a chip which will fit into this hole, with a sharp point or edge projecting. Hold it in place with pliers, and run hot solder all around it, so that it is firmly imbedded and held fast to the rod. By properly selecting a good cutting edge, this tool will work very well for making graduations and marks on glass.

To Carry Water without Spilling

When water is carried in an open pail, tub, or barrel, it has an unpleasant way of slopping over, often drenching the person carrying it, or, if it is being transported in a wagon, it splashes over the occupants of the vehicle. One remedy is to cut a piece of burlap, or gunny sacking, to about the size of the pail or barrel top, and place it on the surface of the water. This method reduces the surface disturbance to a minimum, thus preventing much discomfort. It is especially useful when the pail has no cover.—J. T. Bartlett, Ft. Collins, Colo.

Auxiliary Mirror Aids in Shaving

Shaving in a room where the light is on one side of the mirror is difficult, because, while one side of the face is brightly illuminated, the other is shaded. A small mirror, placed as shown in the sketch, will reflect light to the shaded side of the face, making it as easy to shave that side as the other.



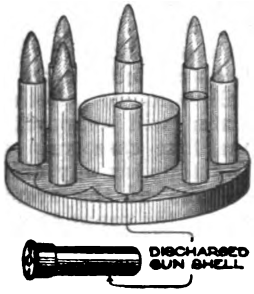
A Small Mirror may be Used to Reflect Light onto the Shaded Side of the Face

Drop-Cord Shortener

Various devices are in use for fastening the cord of a hanging incandescent lamp so as to adjust its height. One of the simplest ways of doing this is to slip a loop of the cord through a short length of small fiber tubing, of the right diameter to give enough friction to hold the lamp in position.

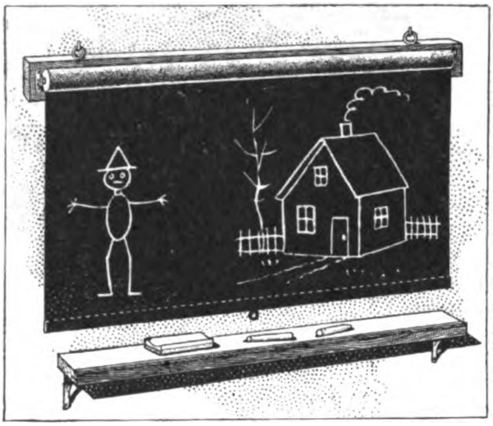
Cigar Stand for Gun Club

A member of a gun club may provide a cigar stand for himself and friends by utilizing a number of discharged No. 12 gauge shotgun shells. These are fastened with glue, open ends up, in holes bored around the circumference of a suitably sized board. A metal ash tray may be fastened in the center of the board, and the whole stand given a coat of shellac or varnish. If desired, the bottom of the stand may be covered with felt.



Using Old Window Shade as a Blackboard

A blackboard that is out of the way when not in use, and which can be at service instantly when wanted, is made by hanging an old, dark-green window shade from the molding in the children's room. This color serves as well as the black of a regular blackboard, and the material is easily cleaned with an eraser. The shade can be hung either from a piece of wood to which the fixtures have been fastened, or from the molding. When not in use, the "blackboard" can be rolled up. The advantage of having the roller attached to the piece of wood is that screw eyes can be fastened into it, and the blackboard hung up anywhere from hooks or nails in the wall.—Charles A. Goddard, Los Angeles, Calif.



Children need Not Be without Blackboards as Long as Dark-Colored Window Shades can be Obtained

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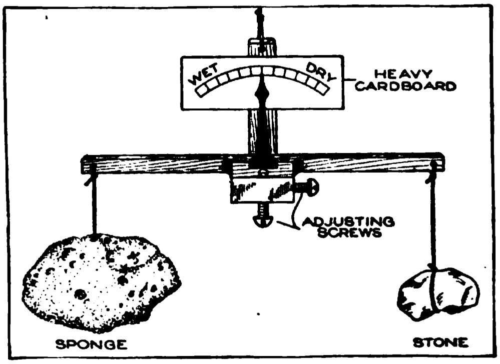
A Simple Weather Indicator

The weather indicator shown in the sketch is of very simple construction, but if carefully made, it is capable of great accuracy. In principle it is what is known as a hygrometer; that is, it tells whether the air contains as much moisture as it will hold, or whether it is so dry that water will evaporate quite rapidly. In the first case, rain may be expected at any time, as any chill through the upper regions of the atmosphere might cause the water vapor to collect and fall as rain. If, on the contrary, the air is quite dry, a similar change of temperature will not produce rain.

The short vertical stick, shown suspended from a string, may be held either in this manner, or attached to a wall. The crossbeam is fastened to it with a small screw or brad, on which it should turn quite freely. From the hole in the left end of the beam is hung a sponge, which has been soaked in very salty water and then allowed to dry without squeezing the water out of it. The salt remains distributed in a finely divided deposit throughout the sponge. In wet weather, this salt will take up from the atmosphere enough moisture to cause a slight difference in the weight of the sponge, and when the air becomes dry, some of this moisture will again evaporate into the air. It is by showing these changes in the weight of the sponge that this instrument indicates the condition of the atmosphere.

From the other end of the beam is hung a pebble or small piece of iron, which is almost of the same weight as the sponge. As it will be difficult to make this weight exactly equal to the sponge to be balanced, a horizontal adjusting screw may be placed in a block mounted just below the center of the beam, to provide accurate adjustment. This screw should work quite freely in the hole, so that it can be turned by a touch of the fingers. By unscrewing it, the weight is thrown slightly to the right, which has the effect of making the pebble side heavy; screwing it inward makes the weight of the right side slightly less.

The hole in the center of the beam, in which is placed the pivot nail or screw, should be drilled slightly below a straight line connecting the two holes at the end. Then the beam will not rest in a level position, even if the weights at its ends are perfectly balanced, but will tilt one way or the other. This condition is reversed by the addition of the block which holds the adjusting screws.



The Tendency of Finely Divided Salt to Absorb a Slight Amount of Moisture is Taken Advantage of in Constructing This Hygrometer

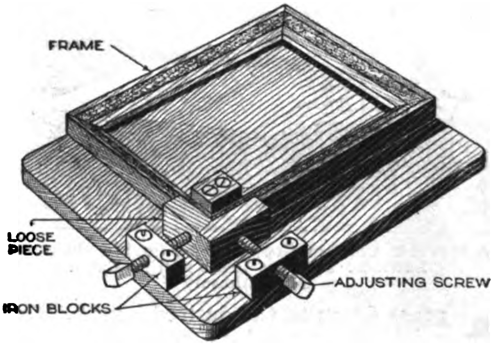
The pointer attached to the beam may be cut out from pasteboard, or from a piece of a tin can. A card, tacked onto the stick, will make it easier to observe the movement of the pointer, and the space over which it moves may be divided off into equal lengths. The word "wet" is placed on the same side as the sponge, and the word "dry" on the other side. In adjusting the hygrometer to a perfect balance, use is made of two heavy screws as weights, placed one in the side and one in the bottom of the block. The horizontal screw should be turned until there is no tendency of the beam to revolve more in one direction than in the other; the vertical screw should then be set to hold it this way normally and yet allow it to move with the required degree of sensitiveness. This adjustment should be made on an average day, when the air is neither very wet nor very dry. Observation of it can be made from time to time, and marks placed on the card, showing the farthest points reached on both sides over a period covering both wet and dry weather. If the pointer goes off the scale, unscrew the vertical adjusting screw slightly. If it does not move much, set this screw farther in. After gradually getting the instrument into proper adjustment, it will give interesting and quite reliable information, as to the amount of moisture in the air, or what is called by the weather man the "relative humidity."
—S. Leonard Bastin, Bournemouth, Eng.

Using Coins as Weights

In an emergency, coins can be used as weights. The weights, as given below, are near enough for most practical purposes, the error being not over 3½ per cent from the weights given. A dime weighs 40 grains; a cent, 50; a nickel, 80; a quarter, 100; a half-dollar, 200, and dollar, 400 grains. By addition and subtraction of these known weights, it is possible to get almost any combination. For example, to weigh 20 grains of a chemical, place a quarter in one pan of the scales, and a nickel in the other, then add enough of the chemical to the pan containing the nickel to balance the scales.

Clamp for Picture Framing

A convenient way to hold molding, while it is being glued to form a picture frame, is to fasten on a flat board three blocks, as shown, by means of two screws in each. Working in two of these blocks are setscrews, as shown, these coming against a right angle block, not fastened, which in turn clamps the molding against the block inside of the frame. The blocks between which the molding is clamped should be carefully squared, and a quite accurate job will result.—J. H. Moore, Hamilton, Ont., Can.

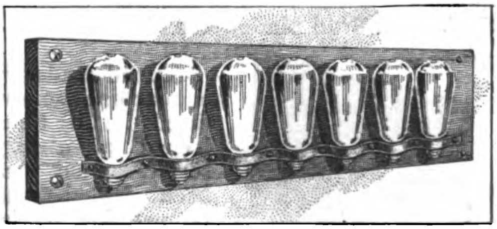


Two Setscrews Clamp the Members of the Picture Frame to Each Other, and Hold Them at a Right Angle

Lamp Bulbs Used as Fire Extinguishers

Cheap fire extinguishers for the workshop or laboratory can be made of a number of old burnt-out electric lamp globes. The lamps are placed in a rack, such as the one illustrated, after being filled with water, or better, with some solution having special fire-extinguishing properties. One such solution can be made by taking 20 parts calcium chloride, 5 parts of common salt, and 75 parts of water. The globes are filled by immersing them in a pail containing the solution, and breaking off the tips with a pair of pliers. They will fill quickly, owing to the fact that the air has been largely exhausted from them during manufacture.

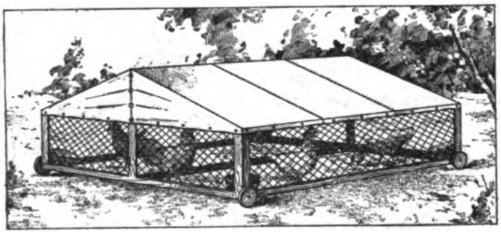
When a fire occurs, one or two of these globes are thrown at the burning object. The solution will spatter over it, extinguishing the fire.—Elmer W. Schaller, Mendota, Ill.



Burnt-Out Lamp Globes Filled with Fire-Extinguishing Solution will Reduce the Fire Risk in the Laboratory

Chickens Act as Lawn Mower

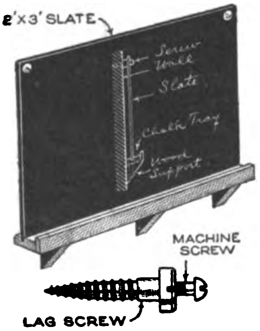
The movable coop shown in the sketch is used to confine a small flock of chickens to a portion of the lawn until they eat the grass down to the desired length. The coop is then moved to a new location. Repeating this process keeps the lawn trimmed, and provides the chickens with green food. The coop is a light wooden frame made of panels joined at the corners with iron brackets. Wire netting is used to cover the sides, and the top is roofed with 8-oz. cotton duck, which sheds rain and protects the chickens from the heat. Four small wooden wheels, attached with bolts at the corners, make it possible to push the coop about easily. Drinking fountains are attached to two corners and food hoppers at the other two corners.


A Movable Chicken Coop may be Pushed about the Lawn So That the Grass will be Eaten Off Uniformly

Filling a Fountain Pen with a Match

When filling an old-fashioned fountain pen which is not provided with the self-filling mechanism, in the absence of a glass pen filler, a good substitute is a match or small stick of wood. If dipped into the ink and held so that the ink drops into the holder of the fountain pen, the operation, although not quite so rapid as with the filler, will be clean and satisfactory.

A Wall Stud Made from Two Screws



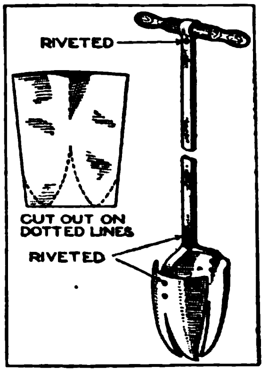
A stud made of a machine screw fitted into the head of a lag screw, which has been drilled and tapped for it, is useful for fastening a blackboard or other article firmly to a wall of plaster, wood, or brick.

To Save Printing Paper

When buying printing paper for a small camera, considerable money can be saved by buying paper in the larger sizes and cutting it to size with a knife. For instance, for pictures 3¼ by 2¼ in., get paper 3¼ by 5½ in. and cut it in two, or for pictures 2½ by 4¼ in., get 5 by 7-in. paper, and three full-size prints can be made from each sheet. If much printing is done, this saving counts up to quite important sums.—Fred C. Davis, St. Joseph, Mo.

A Post-Hole Digger Made from Two Shovels

A post-hole digger, or auger, made from two old shovels and a piece of heavy strap iron, will enable one or two men to dig a post hole by merely revolving the tool with some downward pressure. The two shovel blades are cut and fastened as shown, the blades being bent so that they cut off a slice of earth as they revolve in the hole. The tool is especially useful in clay or soil which is not full of stones; if many of these are present, the tool must be made quite strong and heavy.

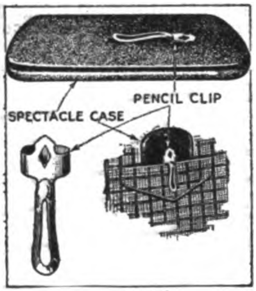


Ice Water Used to Prevent Photographic Halation

While in service as a military photographer in the United States Army I was assigned to take a picture of a group of loving cups which were to be awarded as tokens of appreciation for distinguished service by regiments overseas. Because of the high polish of the cups, two photographers, previously sent out on the job, had failed to take a satisfactory picture. All they had produced was an image of the glaring reflection of the light as it was hurled from the subject.

I realized that, to get a picture, some method of reducing the reflected light would have to be worked out, so proceeded to fill the cups with ice water. Soon the outside surface of the metal began to "sweat" and instead of the glistening silver which refused to record properly on a photographic plate, the cups had a dull finish which absorbed rather than reflected the light. Proceeding with my exposure, I obtained a perfect picture, much to the surprise of my commanding officer, who admitted that the ice-water idea had never occurred to him, and that he could think of no way of effectively overcoming the halation.—John Edwin Hogg, Alhambra, Calif.

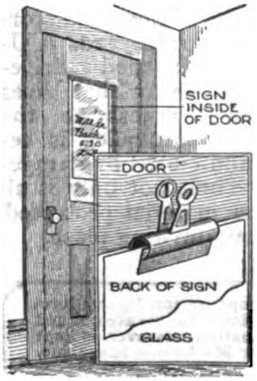
Clip Prevents Losing Spectacles



Persons who wear glasses part of the time only, often experience the trouble of losing the cases in which they are carried when not in use. An ordinary pencil clip, fastened to the case, will usually prevent this loss. The wings of the clip which fit around the pencil are spread slightly and inserted in slits cut in the covering of the case. As the clip is pushed down against the case, the wings flatten out entirely to fit against the metal. While the clip will hold in most cases in this way, it should be riveted through the metal for best results.

A still safer way of carrying the spectacle case, which is also applicable to the fountain pen or pencil, is to fasten a safety pin inside of the pocket, and clip the case or pen to the pin. In this way, the object is kept entirely inside the pocket, but firmly fastened by the clip.—A. E. Kipps, Hamilton, Ont., Can.

Sign Holder for Glass Store Door

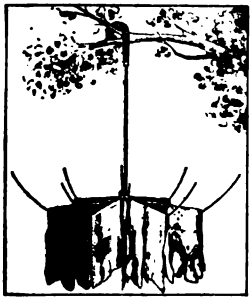


Posters and price lists, usually gummed to windows or jammed under the woodwork, are easier to hang, and are held more firmly, when suspended from large paper clips, screwed to the door frame. They can be quickly changed, and are not easily spoiled.

Arbor of Woven-Wire Fencing Supports Pole Beans

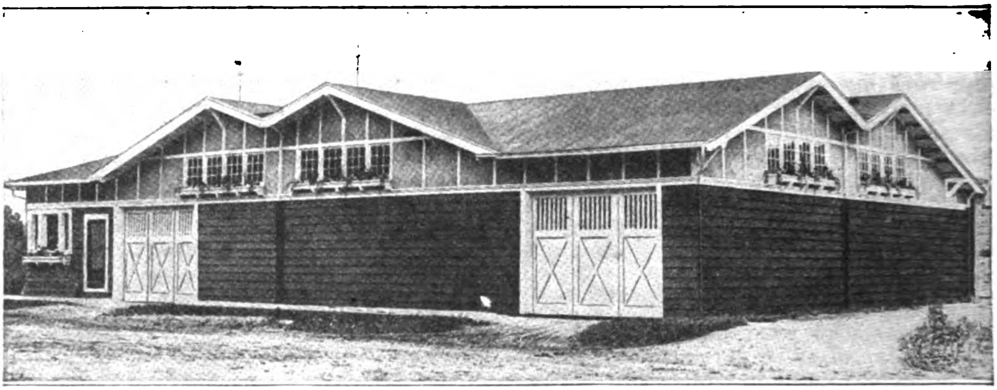
In a garden where space is at a premium, as it is in the city, a place to plant pole beans or other crops which require a great deal of room, is difficult to find. The arbor shown in the drawing solves the problem in many cases. It consists of a light wooden framework upon which woven-wire fencing is stretched. End pieces of 2 by 4-in. lumber are driven into the ground at each end of the row. Pieces of 2 by 2-in. lumber are nailed to the 2 by 4-in. pieces at the top. The netting is supported by 2 by 2-in. pieces extending along the rows and resting on the crosspieces nailed to the stakes. It is not necessary to tack the wire to the horizontals or to the stakes; merely twisting it around the 2 by 2-in. strips will hold it in place with somewhat greater strength than would be secured by tacking it.—Roy H. Poston, Flat River, Mo.

Clothes Rack Made from Umbrella



An umbrella which has seen its last days of usefulness as a protection from rain, may still be very useful to its owner. Rip off the cover and clean the frame, taking special pains to remove all traces of rust. Then enamel the frame, using preferably a white, glossy enamel. This is to prevent further rusting. The umbrella, changed in this way, may be inverted, and used as a drying rack for small articles, such as collars and handkerchiefs. It may be hung either indoors or out, depending on the weather.

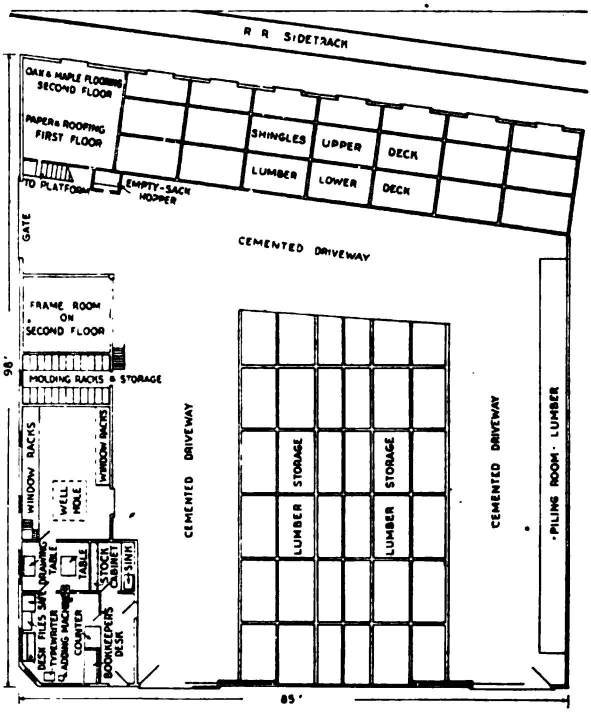
MODEL LUMBER YARD IS COMMUNITY ASSET



The Owner of This Attractive Lumber Yard Believes the Building-Material Merchant should Set a Good Example in His Community. As Compared with the Average Establishment, This One Presents a Remarkably Inviting Appearance

IT is uncommon to find a retail lumber merchant who appreciates the value of having a place of business that is pleasing and inviting in appearance. Yet in one town at least, there is a building-material establishment that may be called both attractive and artistic.

The establishment in question is situated in a small Minnesota town. It consists of a two-story structure, 85 by 98 ft. in ground dimensions, that serves as warehouse and office. Instead of being a mere shed covered with red barn paint, it is a frame and stucco building, not greatly unlike a bungalow in design. The lower part of the structure is finished in redwood siding, stained a rich brown, while the upper part is of paneled stucco, with long flower boxes filled with growing plants installed before groups of small-paned windows. The exterior trim is white, while the roof, with overhanging eaves, is gabled and low like that of a cottage.



Showing the Interior Arrangement of the Unusual Structure, Which Contains Office, Warehouse, and Storage Yard

The office occupies one corner of the building, the remainder of which is utilized as a warehouse and storage yard. A U-shaped driveway that gives access to the material stores and lumber piles is cemented throughout and closed by garage-type sliding doors. Thus, not only is all the lumber and other material protected, but it is kept in a clean, inviting place.

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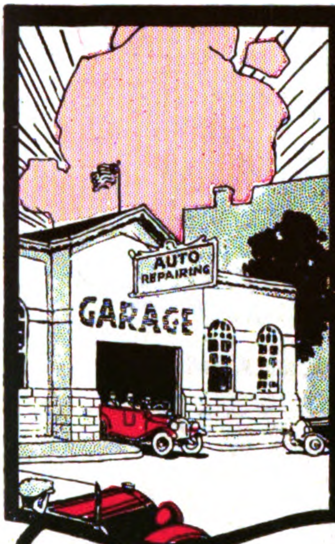
Airplane Collides with Locomotive
See Page 814



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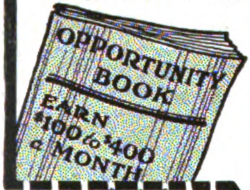

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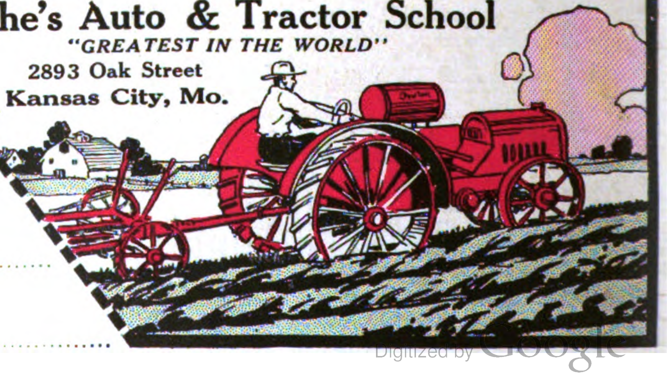

Popular Mechanics Magazine

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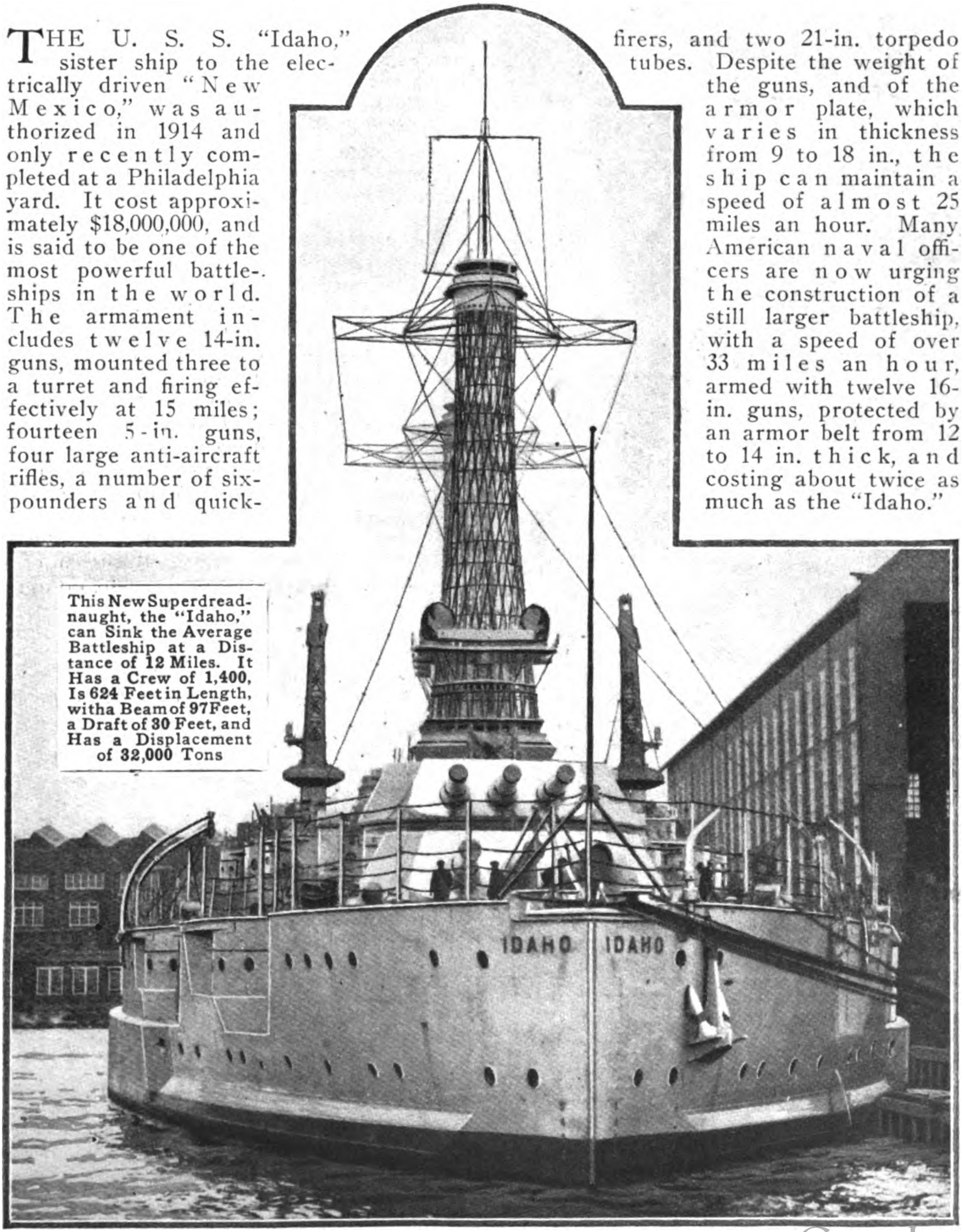
Vol. 31 JUNE, 1919 No. 6

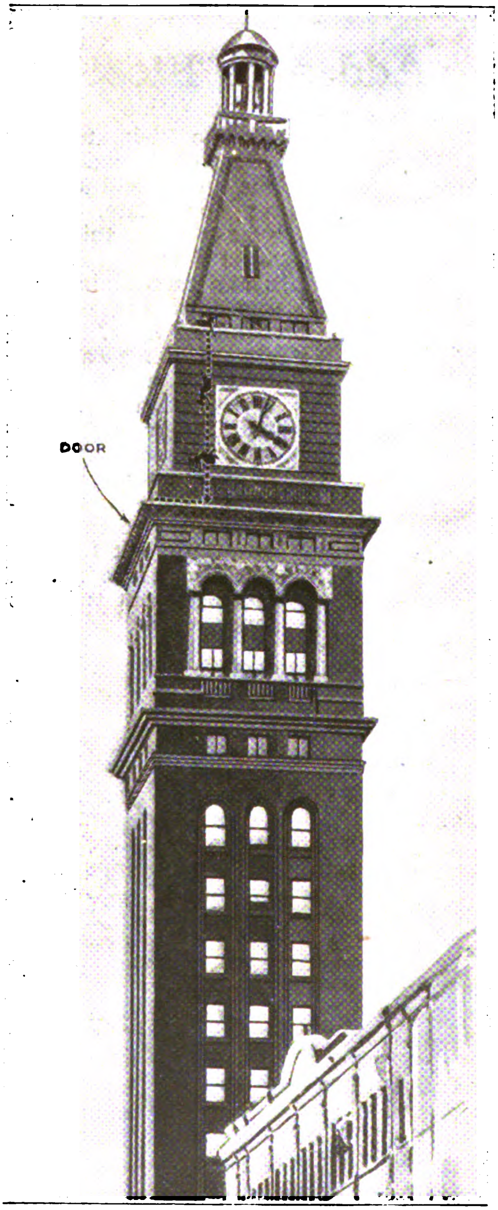
Dreadnaught "Idaho" Added to Fleet

THE U. S. S. "Idaho," sister ship to the electrically driven "New Mexico," was authorized in 1914 and only recently completed at a Philadelphia yard. It cost approximately $18,000,000, and is said to be one of the most powerful battleships in the world. The armament includes twelve 14-in. guns, mounted three to a turret and firing effectively at 15 miles; fourteen 5-in. guns, four large anti-aircraft rifles, a number of six-pounders and quick-firers, and two 21-in. torpedo tubes. Despite the weight of the guns, and of the armor plate, which varies in thickness from 9 to 18 in., the ship can maintain a speed of almost 25 miles an hour. Many American naval officers are now urging the construction of a still larger battleship, with a speed of over 33 miles an hour, armed with twelve 16-in. guns, protected by an armor belt from 12 to 14 in. thick, and costing about twice as much as the "Idaho."



This New Superdreadnaught, the "Idaho," can Sink the Average Battleship at a Distance of 12 Miles. It Has a Crew of 1,400, Is 624 Feet in Length, with a Beam of 97 Feet, a Draft of 30 Feet, and Has a Displacement of 32,000 Tons

GIRL IN TERRIBLE ADVENTURE FALLS FROM HIGH TOWER



Nurse's Narrow Escape from a Terrible Death is Indicated by Lines Showing the Course of Her Fall from One Balcony to Another, 300 Feet above the Ground

Some adventures, however blood-curdling, leave a not unpleasant reminiscence as a solace. Not of that quality was an accident that befell a hospital nurse at Denver, Col. To while away some spare moments, one recent Saturday morning, she visited the 20th-story balcony of a big department-store building. Her pleasure in the view of distant mountain peaks was changed to misgiving as her gloves—new gloves—slipped suddenly over the balcony wall and disappeared. Curious as to their flight, she leaned out to locate them; leaned just a little too far. As she looked down through what seemed an immensity of space, that strange vertigo of high places seized her. She realized, in helpless terror, that her body was slipping outward over the low wall. Then, in an instant she was whirling downward to seemingly inevitable death.

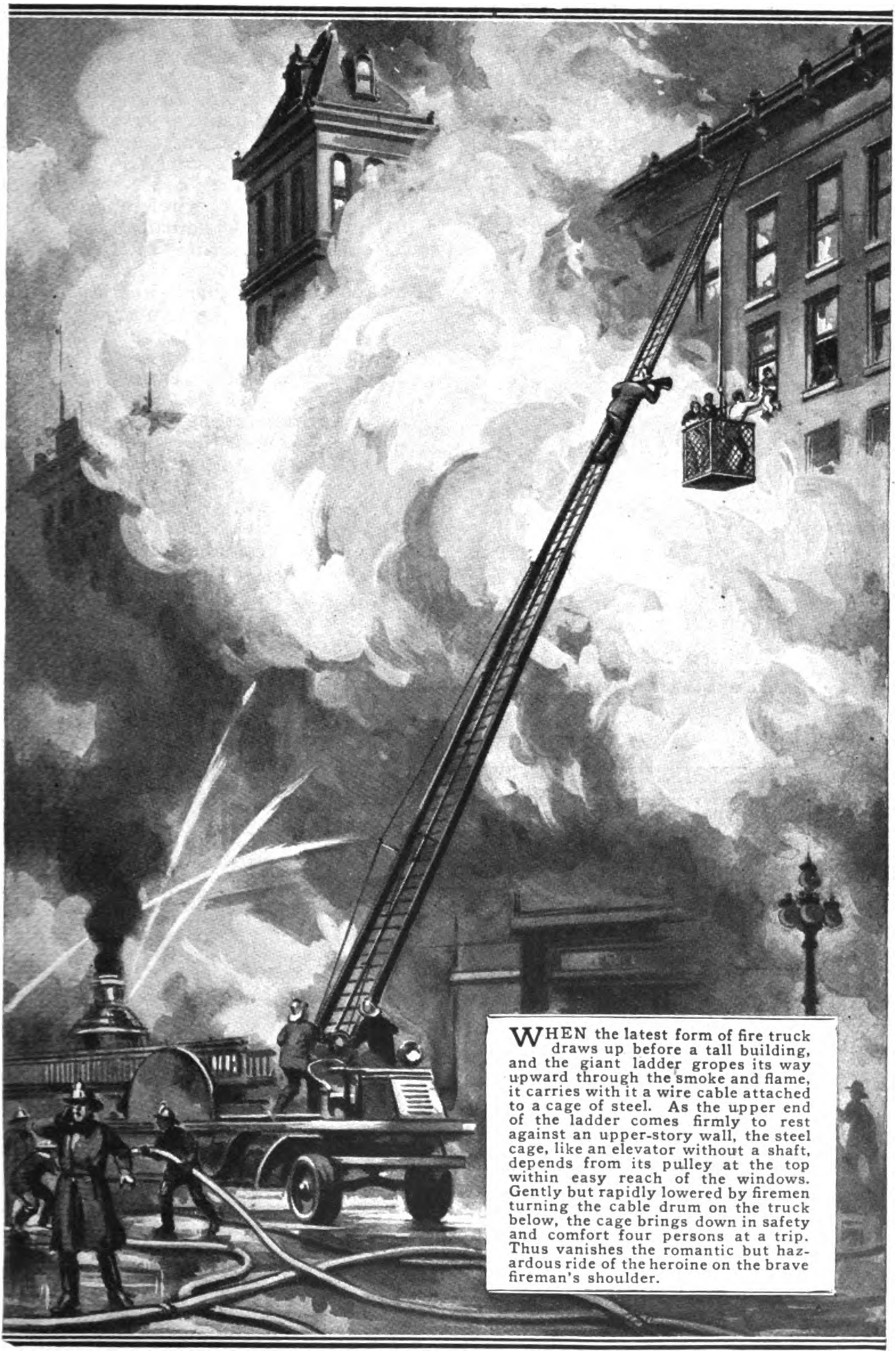
Thirty feet below, another little balcony projected. Its narrow wall caught her as she fell; her body swayed hesitatingly, and slipped, by the merest chance, inward. Below her yawned 300 ft. of sheer drop. By a trick of gravity she was saved! Saved; but not yet rescued. It was 11 o'clock. All Saturday, night, and Sunday, and night again, she dragged herself, bruised and considerably injured, along that narrow way and beat feebly upon a locked door. Cold rain beat upon the concrete; hunger, thirst, and pain assailed her with bitter and hopeless force.

It was nine o'clock Monday morning, 46 hours later, when an electrician upon his rounds heard a faint tapping from an unused room. She was still conscious when he found the key and looked out upon the balcony. Her terrible experience will keep her away from the high places for the rest of her days. If any good can come of such a mischance, perhaps it is not too much to hope that it will influence a movement to see that such high places are not left unguarded.

MARKINGS ON STOLEN CARS IN BULLETIN TO DEALERS

A service of genuine worth is rendered to its patrons by one automobile-manufacturing company. When it is reported to the central factory that a car has been lost or stolen, the factory history is consulted and the car's secret markings collected. In bulletin form these markings are then sent regularly to the company's dealers and garage men, who know that a thief always erases the engine mark but usually overlooks the number on some small, inconspicuous part. In this way the company has been able to recover hundreds of stolen cars in the last few years.

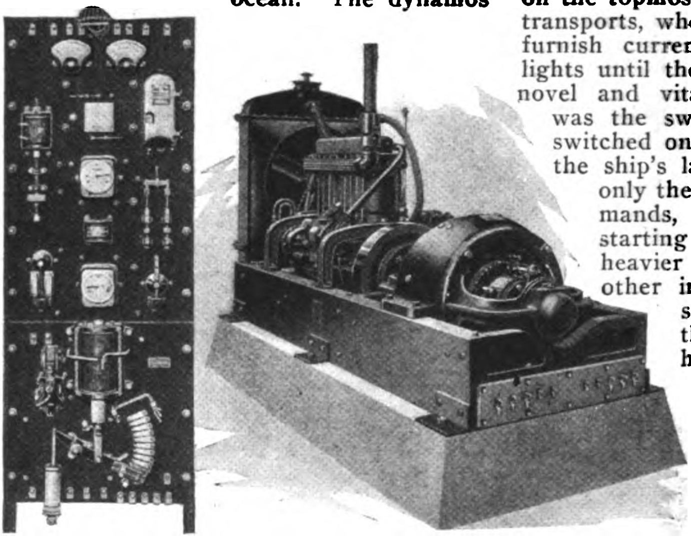
RESCUE CAGE ON TRUCK IS LATEST FIRE ESCAPE



WHEN the latest form of fire truck draws up before a tall building, and the giant ladder gropes its way upward through the smoke and flame, it carries with it a wire cable attached to a cage of steel. As the upper end of the ladder comes firmly to rest against an upper-story wall, the steel cage, like an elevator without a shaft, depends from its pulley at the top within easy reach of the windows. Gently but rapidly lowered by firemen turning the cable drum on the truck below, the cage brings down in safety and comfort four persons at a trip. Thus vanishes the romantic but hazardous ride of the heroine on the brave fireman's shoulder.

EMERGENCY GENERATING PLANT ON TRANSPORT'S TOP DECK

Nothing more disheartening is known to warfare than the unexpected explosion of an enemy torpedo near the boiler room of a solitary, troop-laden transport in mid-ocean. The dynamos are quickly flooded, perhaps even before the precious wireless signals are sent; at night the ship sinks in darkness with decks and corridors the scene of helpless confusion. To avoid any such disaster on American ships, special gasoline-driven generating and storage sets were installed on the topmost decks of many American transports, where they could continue to furnish current for wireless and deck lights until the ship actually sank. The novel and vital feature of the plants was the switchboard which instantly switched on the small generator when the ship's large dynamo failed, using only the storage cells for small demands, of 25 amperes or less, but starting the generator itself for heavier loads. The board does other interesting things, too: It starts the generator when the batteries approach exhaustion; it displays a red light when the motor refuses to start after three minutes' cranking, and it even tests the plant with a 20-minute run once every 24 hours. The plant may also be started by various push buttons, one being in the wireless room.



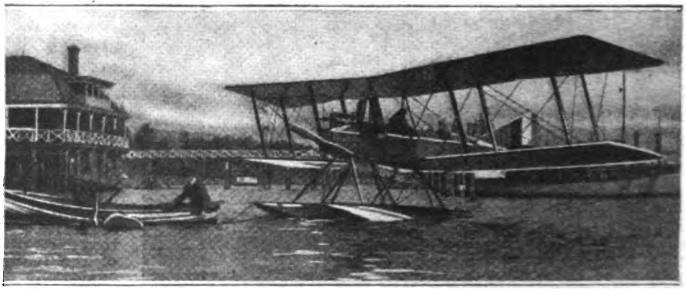
The Automatic Switchboard on the Left was Designed to Give Unfailing Control of the Auxiliary Generating Plant on the Transport's Top Deck. Its Chief Function Was to Throw In the Auxiliary Line When the Potential Dropped in the Ship's Mains

AMERICAN ENGINEER INVENTED ANESTHETIC EUROPE USED

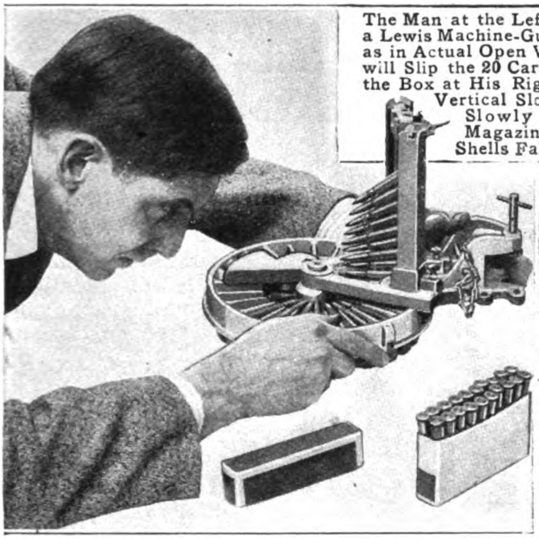
Nikalgin, the external anesthetic used so successfully in army hospitals on the Verdun and Somme fronts, and at Paris, is the invention of an American electrical engineer. The Greek components of the word mean "victory over pain." The American also designed a jet for applying the solution with sufficient force to penetrate gauze dressings and pus-coated surfaces. The preparation is reported to be composed of quinine, hydrochloric acid, and urea, but the manner of compounding it is not disclosed. The dispensing of large quantities to the French and Italian armies by the Red Cross has prompted a request for a senate investigation of America's failure to adopt it for war work.

INTERNATIONAL AERIAL MAIL MAKES FIRST DELIVERY

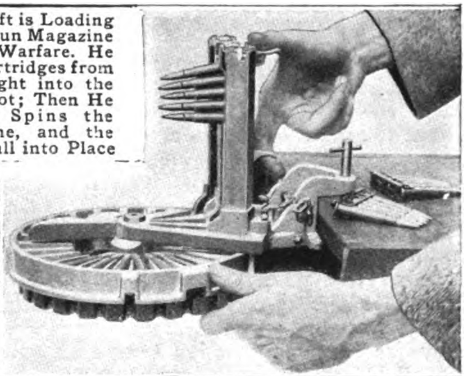
It was the Canadian-United States boundary, of course, that was crossed in the first international transfer of mail, which was accomplished March 3, 1919. The flight, which was from Vancouver, B. C., to Seattle, Wash., was made by W. E. Boeing, of Seattle. The distance is approximately 125 miles.



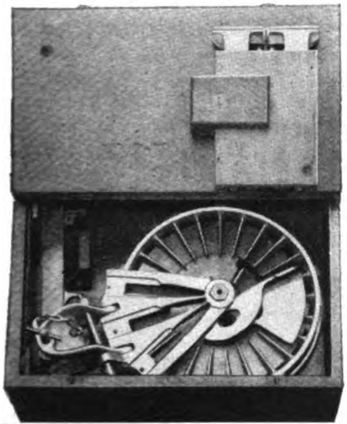
International Mail Airplane About to Leave the Harbor of Vancouver, British Columbia, for the Flight to Seattle, Washington, the First International Aerial Mail Route



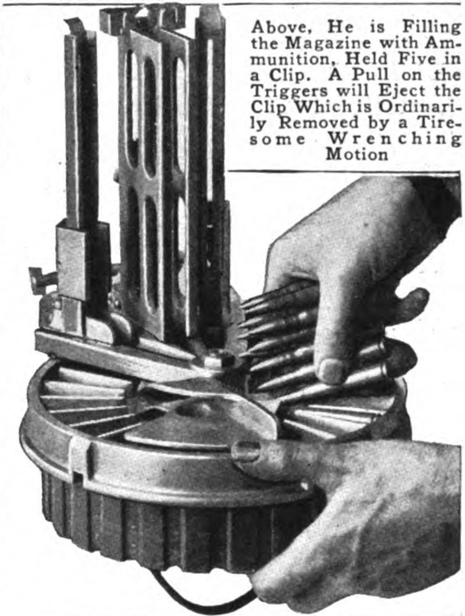
The Man at the Left is Loading a Lewis Machine-Gun Magazine as in Actual Open Warfare. He will Slip the 20 Cartridges from the Box at His Right into the Vertical Slot; Then He Slowly Spins the Magazine, and the Shells Fall into Place



Above, He is Filling the Magazine with Ammunition, Held Five in a Clip. A Pull on the Triggers will Eject the Clip Which is Ordinarily Removed by a Tiresome Wrenching Motion



At the Right, the Loading Machine is Shown in Good Detail. Cartridges are being Inserted into Radial Chambers by Hand, However, as Is Often Necessary in Aerial Gunnery Where Common, Tracer, and Incendiary Shells are Sometimes Loaded in Rotation, and Only after a Careful, Individual Inspection. At the Left, the Apparatus is Shown Disassembled, and Packed for Transportation in Its Wooden Case



LOADING DEVICE FOR LEWIS GUNS ADAPTED TO ALL EMERGENCIES

One of the war secrets that it is now permissible to disclose has to do with an invention adopted by the War Department in the latter months of the conflict, which tremendously multiplied the effectiveness of the famous Lewis machine gun by enabling one man to attend to the loading of a score or more of these deadly weapons, so that those assigned to these pieces could deliver practically an uninterrupted fire. The ammunition for the Lewis gun is contained in a detachable circular magazine holding either 47 or 97 shells. This holder is called a pan, and the new invention consists of a device, to the underside of which the pan is temporarily attached for filling with shells. The loader is so designed that it can be mounted on the edge of a box, held in the lap, or used while one lies prone on the ground out of view of the enemy.

In action, the ammunition for the Lewis gun is usually taken from clips holding five shells each, or from boxes containing 20 shells each, or it may sometimes be necessary to load the gun by hand where tracer or other special shells are to be used. This rapidly operating loading device is suited equally well to all these varying conditions—a fact which accounts for the large orders for the device placed by the War Department.

When the boxes of cartridges are to be emptied a box is held in a vertical position, and with two downward strokes of the hand the shells are transferred to the vertical grooves, or holder, extending upward from the revolving loading wheel above the pan. When emergency, or other circumstances, makes it necessary to take shells from filled "clips," the latter are dropped into the vertical grooves and, by operating a pair of triggers with the thumb and finger, the clip is ejected. A turn of the wheel causes the shells to drop into the 20-odd chambers radiating from its center, and as the wheel revolves, they are fed into the pan temporarily attached beneath.

If, in a gas attack, it is necessary quickly to empty loaded pans so that the gas will not cause a sticky corrosion on the surface of the shells—as experience showed it would do when in contact with the ammunition—the machine can be reversed and the shells quickly removed from the holders or pans.

A further advantage of this adaptable machine is that it can be disassembled and packed into very small space, and carried either in a small wooden case or in a light canvas bag hung over the shoulder.

BRONZE RANGER AND HORSE GUARD TEXAS PRAIRIES

Near the spot where a young Texas ranger, Charles H. Noyes, met with a fatal accident three years ago, his life-size figure in bronze, leaning on a big bronze horse, is now being erected. The youth, only 21 years old, was 6 ft. 4 in. tall, and his statue, worked with exquisite care by a celebrated sculptor, immortalizes the stalwart virility of the western plains. In the eyes of the grieving father who conceived it, the bronze is a memorial to an only son, but to those keenly alive to the glories of the West, it is a perpetuation of vanishing romance. The statue rests upon a pedestal of granite mined from quarries near the Texan's own home, on a knoll overlooking a beautiful valley.

Life-Size Bronze Statue, Executed in the Benvenuto Cellini Process by Pompeo Coppini, as a Memorial to a Young Texas Ranchman: It will Stand Guard over the Prairies of His Home State

¶A shopper may see her pastry pulled out of the oven in a large electric bakery recently installed in a metropolitan department store.

RECORD OF EACH AUTOMOBILE TO FOIL SKILLED THIEVES

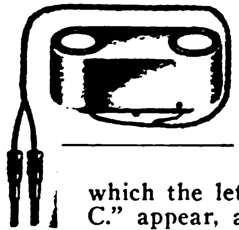
Automobile stealing is becoming a highly developed art, and such a growing one that insurance companies have united with the great manufacturing interests to stamp out the evil. Just as they classify the offenders as the amateur who steals to joy-ride, and the professional who steals to sell, so the remedies they suggest may be divided into two classes. To foil the impetuous, usually befuddled joy-rider only a good lock is needed. Any standard make with the approval of the insurance companies will do. But to thwart the skilled auto thief locks are not enough; he is quite prepared to tow the car away, locks and all. The remedy that is really needed, they say, is national legislation that will remove the thief's incentive, that will make it impossible for him to sell the car. They would have the car accompanied by a title or deed at every change of hands, like real estate, or other property.

BUY WOOD FUEL BY WEIGHT, NOT BY BULK, SUGGESTED

The popular household fallacy that hard wood has greater fuel value than soft is condemned in a government forestry bulletin as true in only a limited sense. Thus, one cubic foot of hard wood will probably yield more heat than one cubic foot of soft; but, comparing equal weights, it is found that their heat values are practically the same. It is therefore advised that future purchases of wood for household use be made by weight, so that the heating value secured may more nearly correspond to the money expended. Another objection to the present system of buying by volume is that, with varying shapes and sizes, the purchaser never really knows how much he is getting. The suggestion is also made that the present coal shortage could be greatly relieved by burning wood and brush secured from judicious thinning of the forests surrounding many rural communities.

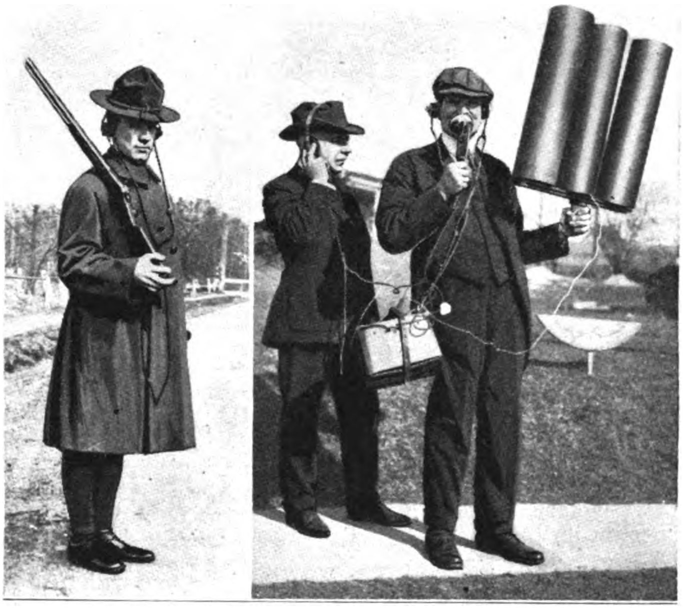
POCKET ELECTRICAL DEVICE TELLS KIND OF CURRENT

Electric current is available to most people, but it is not always apparent whether it is direct or alternating, 110 or 220 volts. A new pocket instrument, 4 in. long, 2 in. high, and 1½ in. wide, has a dial at each end in which the letters "A. C." or "D. C." appear, as the case may be, when the flexible cords are connected to the circuit. The voltage is indicated in the same manner. Provision is made for connecting to any kind of terminal, a plug being provided into which the posts on the wire-ends fit, for lamp-socket testing.



RADIOTELEPHONE STATION IN A HANDBAG

Pocket wireless, that elusive objective of science, is only a step away; for the handbag radiotelephone has arrived. A 12-lb. bundle of apparatus, something like an umbrella, for example; an antenna, and a head telephone, constitutes the full equipment of a personal wireless station successfully demonstrated by a Philadelphia inventor. With his rifle for the antenna, a soldier executed commands uttered over 200 yd. away by the inventor, whose wave-sending aerials consisted of three lengths of stovepipe mounted on a board. Three men in a moving auto listened while the fourth held converse with his wife in a garage 500 yd. back, the car body serving as the wave collector. The exact nature of the apparatus is not yet divulged; but that no part of it is really new has been disclosed. The current consumed is exceedingly small, and the estimated cost is so moderate that before long, perhaps, these traveling radio sets will be a common sight.

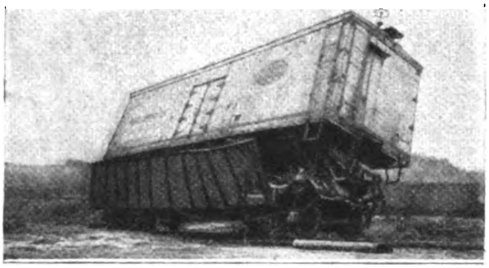


The Soldier at the Left, with the Cords of His Head Telephone Clipped to His Rifle, can Hear at 200 Yards' Distance the Orders of the Man at the Right, Whose Antenna Consists of Three Lengths of Stovepipe. All the Rest of His Wireless Equipment Is in the Little Box at His Side

¶Twenty million tons of paper pulp can be produced annually from India's bamboo and grasses, declares a recent estimate.

DERAILED FREIGHT CAR LANDS ON TOP OF LOADED GONDOLA

When a dragging brake beam derailed a freight train at Hamilton, Ontario, recently, a heavy refrigerator car concluded the performance by climbing, trucks and all, on top of a gondola car loaded with steel plates. The wrecking crew, hurrying to the rescue, forgot to lower their crane and it knocked a highway bridge out of shape. The gondola car, with its extraordinary load, was finally hauled away on its own wheels.



The Refrigerator Car was Thrown, Trucks and All, on Top of the Gondola Car by a Dragging Brake Beam, and the Gondola, with Its Strange Load, was Hauled Away on Its Own Wheels

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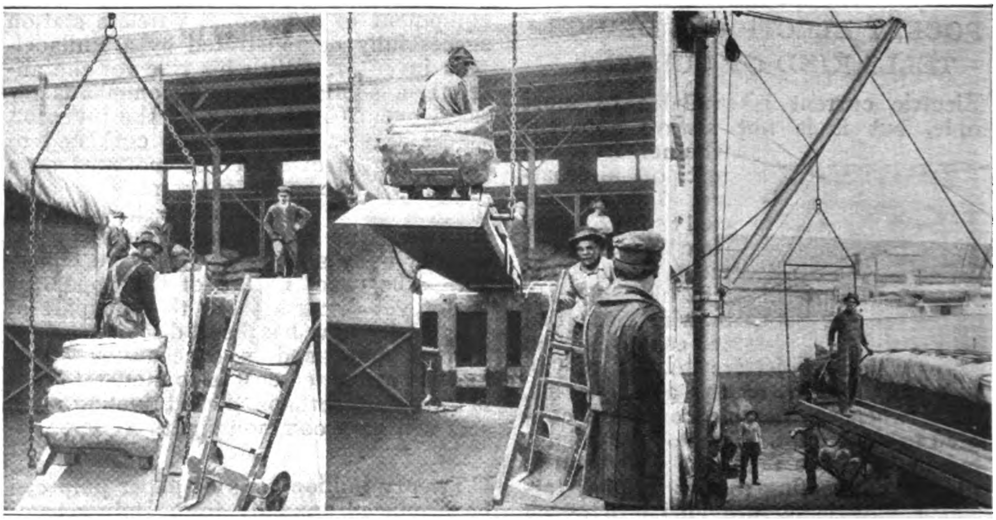
ℭThe Atlantic Ocean recently swallowed up 200,000 gas shells and many large drums of poison gas that were intended for German consumption. The gases were commercially valueless, and it was feared that the containers would be eaten through.

WOOD-STAVE PIPE LINE PUT TO UNUSUAL TEST

Several times during the same season heavy floods lifted a large wooden pipe line, supplying a hydroelectric power station, clear of its supports and battered it against its ballast bed. Yet examination at the end of the season showed that the pipe was perfectly sound and had retained its circular shape throughout. This is noteworthy, as the pipe was almost four feet in bore, was strengthened only by hoops, and was anchored only at the intake. It seems to indicate, too, that wood-stave pipe is a great deal stronger than is generally supposed, and is well fitted for use in hydroelectric plants.

STEAM WINCH MAKES WORK OF STEVEDORES EASY

It usually requires the hardest efforts of two stevedores to push a heavily loaded hand truck from the deck of a small river boat, up a steep gangplank, to the dock. But by hitching a steam winch to the lower end of the incline, and thus lifting stevedore and load a foot above the level of the dock, the work is made so easy that unloading time is cut in half. It will be observed that the steel apron which enables the truck to roll upon the incline also prevents it from rolling back during the ascent. Naturally, the incline is lowered for the next man the instant the stevedore touches the dock.



The Stevedore at the Left has Run His Heavy Load of Potatoes upon the Incline. In the Next Two Pictures He has been Lifted by the Steam Winch to a Position One Foot above the Level of the Dock. With This Arrangement Unloading Time is Cut in Half and the Stevedores Satisfied Entirely

HIGH-ALTITUDE PLANE, FLYING WEST, CARRIED 200 MILES EAST

THAT miles above the earth's surface an air current of high velocity flows eastward with the rotation of our globe has long been known to scientists. A sounding kite has ascended to a height of 28,000 feet and a pilot balloon has reached an altitude of 126,800 feet, or more than 24 miles. A noted meteorologist, Prof. McAdie, Harvard University, estimates this great air current to extend from a height of about 13,000 to over 30,000 feet. Above this is a westward-moving air stratum and still higher another eastward-moving stratum. However, though so much was established, it remained for Maj. R. W. Schroeder in his record-breaking altitude climb of a few months ago to demonstrate, unwittingly, the practical possibilities of the first air stream in its relation to aeronautics and to give substance to the wistful dreams of some of the world's master birdmen. Major Schroeder ascended from Dayton, Ohio, and flying constantly in a westerly direction climbed to an altitude of 28,900 feet—approximately five and one-half miles. Then, being out of gasoline, he descended to find himself neither *near* nor *west* of his starting point as he had expected, but nearly 200 miles *east* of it, near Canton, Ohio. This meant that with his plane traveling *west* at 100 miles an hour the great *eastward* moving air current must have had a velocity of more than 300 miles an hour in order to carry him with it 200 miles. Probably as graphic an illustration as any of what happened to him is afforded by a passenger running through a rapidly moving train. The traveler may go toward the rear at a rate of five miles an hour but nevertheless he is being carried in the opposite direction ten times as fast or 50 miles an hour. Major Schroeder's experiences and sensations on this flight are simply and vividly told by himself.—Editor.

BY MAJOR R. W. SCHROEDER, *A. S. A.*

I HAVE been connected with aviation since 1910, and during this time I have worked as a mechanic for some of America's leading pilots and gained a very valuable training. I was always keen to learn all I could, and I dare say, that all my past experiences were beneficial to me in my efforts to establish a new world's altitude record. The last world's altitude record held by America was made in August, 1911, when the late Lincoln Beachey made a climb to 11,642 ft. at the big aviation meet in Chicago. Since that time G. Legagneux, in France, made a climb to 20,258 ft. on Dec. 28, 1913.

It is to be understood that, for military reasons, I am unable to give a more complete description of the improvements and changes which I made in the motor. I am proud to say, however, that the motor was a Hispano-Suiza, American-built, as well as the carburetor and magnetos, and that the discoveries which were made in these experimental climbs are for the use of the United States government.

In order to take an airplane to a higher altitude than any other pilot in the world, I found that more than one or two attempts would be necessary. I made three, the first taking me to an altitude of 24,000 ft., the second to 27,000 ft., and the last to 28,900 ft., all of which would have been world's records, and now I feel certain that with a few changes and improvements, I can get to 30,000 feet.

Becomes Accustomed to Rare Air

Most people cannot stand high altitudes, and from 10,000 ft. to 15,000 ft. bleed at the nose and ears. I had been to 12,000 ft. at different times and experienced no difficulties. After being put in charge of the testing squadron at Wilbur Wright Field, at Dayton, Ohio, my duties required me to go to the "ceiling" with all new types of high-powered battle airplanes which were being experimented with by the government. (By "ceiling" is meant the highest altitude the airplane can reach, and at this height it will hang in the air by the propeller.)

During these trips I would quite often go without the use of oxygen, and in time I discovered that I was becoming accustomed to the rare, thin air. However, I did not seem to be able to go above 23,000 ft. at any time without experiencing a sort of sleepy, tired, cross, and hungry feeling, which I was able to overcome only by the use of oxygen. Without the use of oxygen at such altitudes, I would have the impression that I was doing everything just right; and even if the airplane would get into some critical position, and, when I looked down, the earth, which should be underneath me, apparently was not there any more, but way over to the other side of the machine, I believed that I was flying all right and that the earth was in the wrong place. After having these experiences, I decided that I would have to overcome the dangers possibly consequent upon them, and the way I did it was to keep my mind on one thing, and that was, to use oxygen when the earth appeared to be in the wrong place. This precaution worked out very well.

Equipment for High Altitudes

The cold, thin air is one's greatest adversary. First of all, one must make a study of the performance of his motor at these high altitudes. This I did, and made the necessary changes each time before trying again. A very positive oxygen regulator and face mask should be used. These were unobtainable, however, for the sets I had previously tried out had failed to function above 21,000 ft. Furthermore, the face mask pressed so tightly against my face, that it interfered with the flow of blood, and my face grew numb. So I used a rubber hose directly connected from the oxygen bottle, regulating the flow with a valve. The hose I placed in my mouth so that I would breathe air and oxygen at the same time. I also pressed my tongue against the end of the hose in order to tell if the oxygen was still flowing. This method worked very satisfactorily, except that the oxygen bottle and the rubber hose gathered about a quarter of an inch of frost, which made it very unpleasant.

Oxygen Changes Night to Day

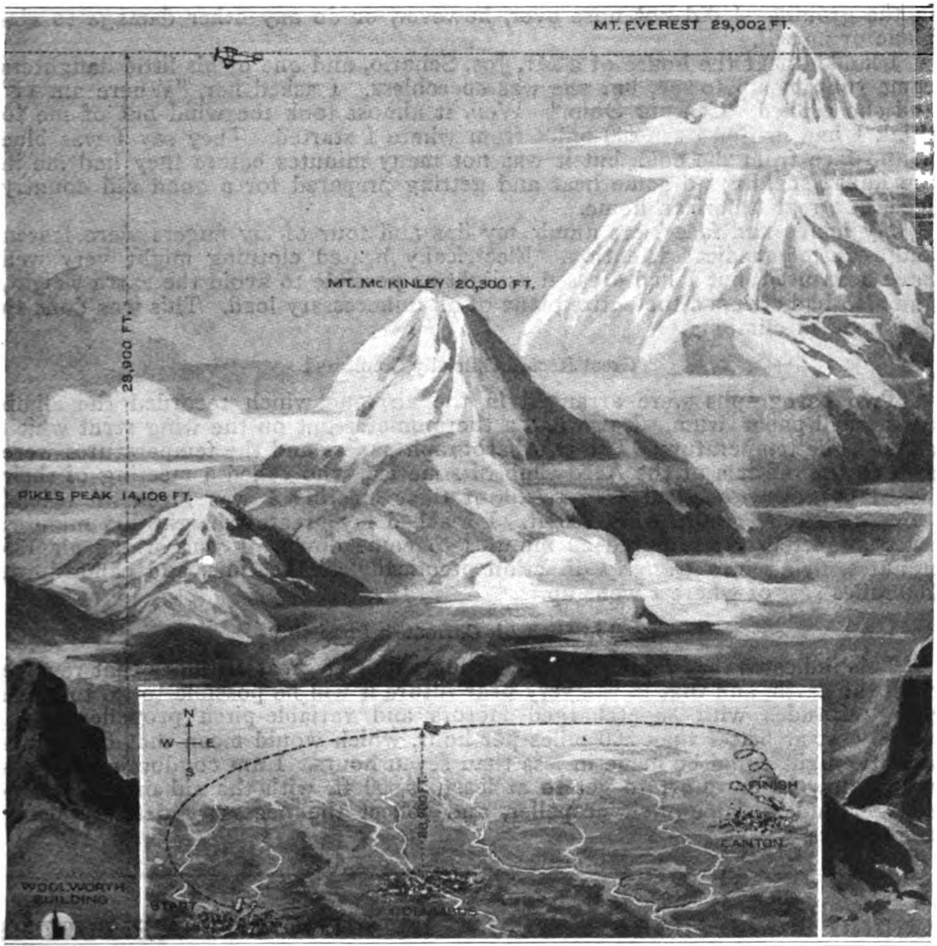
The following experiences and sensations which I noticed during my flight were due to lack of oxygen. I took off at 1:45 p. m., Sept. 18, 1918, and made a steady westerly climb, passing through clouds at 8,000, 12,000, and 16,000 ft. At 20,000 ft., while still climbing in large circles, my goggles became frosted, making it very difficult to watch the instruments. The temperature at this altitude was 18° centigrade below zero. When I reached 25,000 ft., I noticed the sun growing very dim, I could hardly hear my motor run, and I felt very hungry. The trend of my thought was, that it must be getting late, that evening must be coming on, and that this was the reason the sun was getting so dim. But I was still climbing, so thought I might as well stick to it a little longer, for I knew I could reach my ceiling pretty soon. Then I would go down, and even though it were dark, I could land all right, for I had made night landings many times before; and so I went on talking to myself, and this I thought was a good sign to begin taking oxygen, and I did. I was then over 25,000 ft. up and the temperature was 25° centigrade below zero.

As soon as I started to inhale the oxygen, the sun grew bright again and my motor began to exhaust so loudly that it seemed something must be wrong with it. I was no longer hungry, and the day seemed to be a most beautiful one. I felt like singing with sheer joy as I gazed about through the small portion of my goggles which had no frost, due to a drop of oil which had splashed on them from the motor.

It was wonderful to see the very clear blue sky with the clouds thousands of feet below. The frost on my goggles bothered me very much, however. At times I had to remove one glove in order to put the warm palm of my hand on the glass to thaw the frost. I did this every few minutes so that I could take the proper readings of the instruments, which I marked down on my data pad. I believe that if my goggles had been better ventilated, they would not have frosted. When I was at about 27,000 ft., I had to remove the goggles, as I was unable to keep a steady climb. My hands by this time were numb and worried me considerably. The cold, raw air made my eyes water, and I was compelled to fly with my head well down inside the cockpit. I kept at it until my oxygen gave out, and at that point I noticed my aneroid indicated very nearly 29,000 ft. The thermometer showed 32° centigrade below zero. The lack of oxygen was affecting me and I was beginning to get cross. I could not understand why I was only 29,000 ft. after climbing for so long a time. I remember that the horizon seemed to be very much out of place, but I felt that I was flying correctly, and that I was right and the horizon wrong.

Descends to Find Himself Lost

About this time the motor quit. I was out of gasoline, the propeller stopped, and everything was quiet; so, down I went in a spiral. When I had descended to about 20,000 ft., I began to feel much better, and realized that the lack of oxygen had affected me. I passed down through the clouds at 16,000 ft. and as I remember, it was snowing from these clouds upon the next layer, some 4,000



Ascending Westerly, in His Record-Breaking Altitude Flight, Major Schroeder was Carried Eastward Nearly 200 Miles by the Strong Wind Strata Five and One-Half Miles above the Earth and Following Its Rotation. His Flight, as Shown in the Small Diagram, Began at Dayton, and Ended at Canton, Ohio. Had He Been Able to Travel with the Wind at This Great Height, He could have Landed within 102 Feet of the Top of Mt. Everest, Having Passed 12,500 Miles, or Halfway Round the World, in About 42 Hours. Some Lofty American Eminences are Also Shown in the Larger View to Convey an Idea of What It Means to Scale the Skies

ft. below. I am not positive as to this, as I may still have been affected by the lack of oxygen. I noticed, as I descended, that the air seemed to be very thick and stuffy, but very nice and warm.

During the entire trip I did not see the ground, from the time I went up through the clouds above Dayton until I came through the clouds again, at 4,000 ft. above Canton, over 200 miles from my starting point.

I was lost, beyond a doubt, with a dead engine over very rough country. For a few minutes I was a very busy man, trying to find some kind of a field to land in, but nothing looked good to me. However, I had my pick between a half-mile race track, a hilly pasture with a lot of trees, and a graveyard. I picked the race track as the best bet, but when I got down to about a thousand feet, I could see two telephone-pole lines, stretching right across the field, so I glided back over the graveyard and to the pasture full of trees, which was my last chance. And I took it; in fact I had to. I landed all right, but broke the tip of my propeller, which was standing vertical when I rolled into a depression in the ground. I did not nose over, however, or do any other damage to airplane or myself.

I landed near the house of a Mr. Jos. Schario, and one of his little daughters came running up to me, but she was speechless. I asked her, "Where am I?" and she replied, "Canton, Ohio." Well, it almost took the wind out of me to think I had drifted over 200 miles from where I started. They say I was blue in the face from the cold, but it was not many minutes before they had me in the house soaking up some heat and getting prepared for a good old country feed, in a real American home.

My hands and face were numb, my lips and four of my fingers were frozen and required medical attention. Electrically heated clothing might very well have been used, but I had dressed as light as possible to avoid the extra weight, and also had stripped the entire plane of all unnecessary load. This was done to assist me in climbing.

Great Record Officially Confirmed

Two barographs were arranged in the airplane which recorded the climb on a small paper drum. I also had a thermometer out on the wing strut which showed the temperature. The two barograph papers and the temperatures were sent to the officials of the Aero Club of America, who called a meeting of their board of governors, and as a result of their meeting I was given an official world's altitude record of 28,900 ft. I reached my greatest height 105 minutes after I started. It required 20 minutes to come down. I was in the air 125 minutes, flying in a *westerly* direction practically all the time, and came down 200 miles *east* of where I went up.

Travel in High Air Currents a Possibility

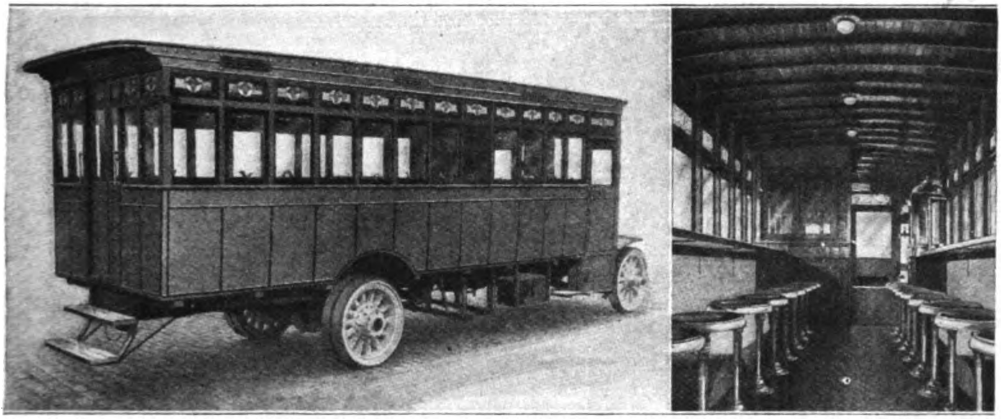
This indicates that there are very strong winds at great altitudes that revolve with the earth, and that in the very near future it will be possible to go to these great altitudes with supercharged motors and variable-pitch propellers, and travel east at better than 300 miles per hour, which would mean that the transatlantic flight could be made in less than seven hours. I am conducting experiments now in an effort to get to at least 35,000 ft. with the aid of the supercharger and variable-pitch propeller, and collect the necessary data by many trial flights.

WARNING SIGNS GUARD PUBLIC AGAINST POLLUTED WATER

Down in southern Ohio there are many happy memories of stolen swims or moonlight canoe trips on the Little Miami River. But with the war came a huge munitions plant—and busy investigators to safeguard the workers' health. The stream was investigated in its turn, and its crystal waters found to be full of germs. So unromantic warnings along its length now frighten the hot and thirsty world away from the innocent-appearing Little Miami River.

ATLANTIC CITY AIR PORT IS FIRST OF KIND IN WORLD

In the heart of Atlantic City, N.. J., lies a large level field that is soon to become the first "air port" in the world. Starting from this port, air craft will be registered, and will receive their clearance papers, exactly as with ships of the sea. This feature will no doubt be most prominent in the future when regular transatlantic flight is assured. Of present importance, however, are several other purposes announced by the three aerial associations behind the scheme. The field is intended as an aerial mail and police station for Atlantic City; it will serve as an aerial garage; it will be a terminal for the coming New York-Atlantic City passenger service; and it is hoped that it will furnish other American cities with an example of a well-managed municipal aerodrome.



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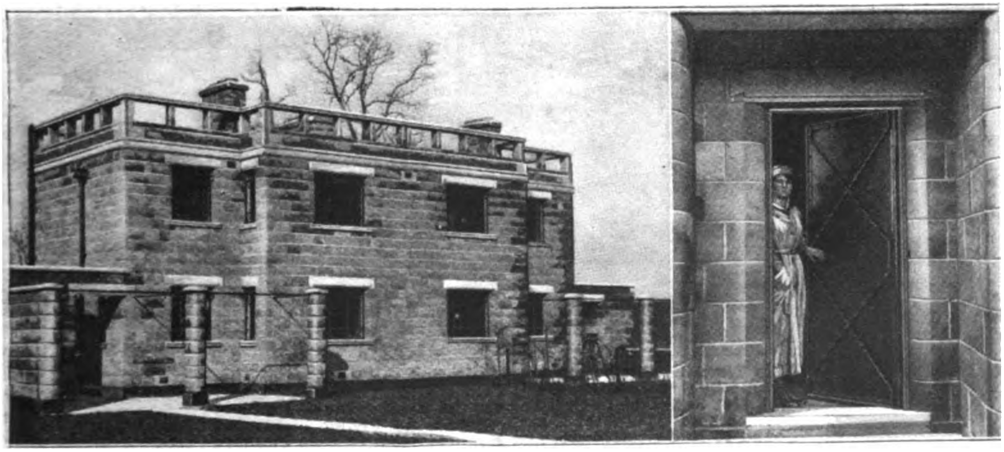
This Is the New York Police Department's Traveling-Restaurant Truck Which will Relieve the Tedium of Long Winter Patrols with Hot Coffee and Sandwiches. It will Hold Comfortably 20 Stalwart Policemen, without Crowding the Shiny Coffee Machine or the Capacious Pantry

MOTORIZED RESTAURANT PLEASES POLICE FORCE

Those who watched the home-coming parade of New York's 27th Division will recall the big motorized "red-hot" wagon which preceded the marchers, distributing sandwiches, apples, and coffee to the wounded soldiers in the stands. They probably did not know, however, that the traveling restaurant is the property of the New York Police Department, and is intended for the refreshment of "coppers" on long, tiresome beats. The body of the car is 21 ft. long and 7 ft. wide, and is mounted on a three-ton chassis. Counters and seats along the sides accommodate 20 policemen, while a coffee machine and a capacious cupboard hold the good cheer. The car is warmed in winter by radiators heated from the exhaust manifold.

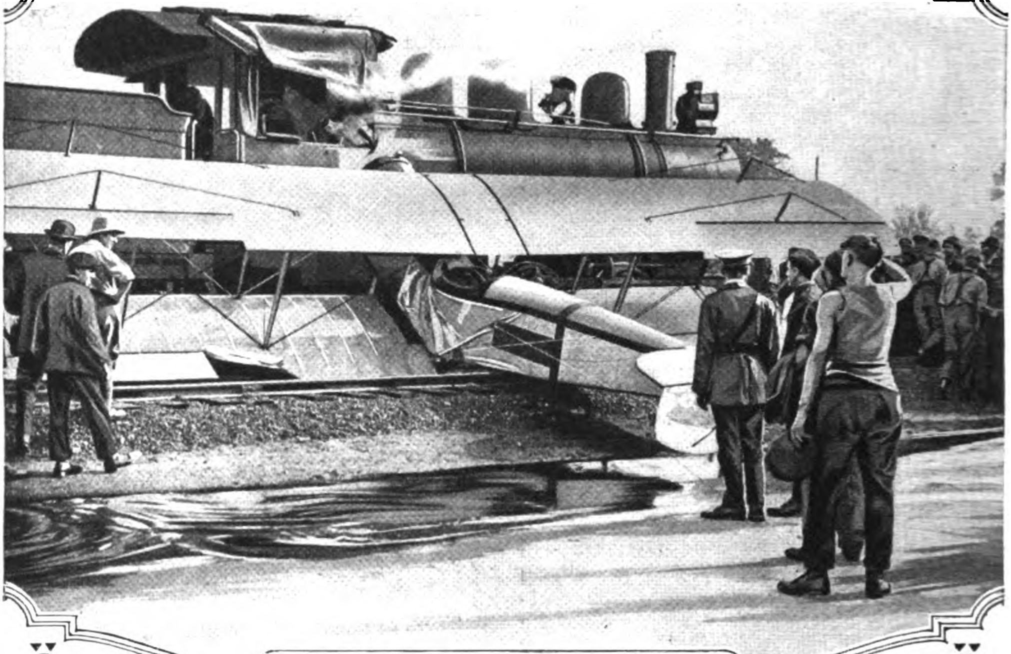
EVEN SHELVES ARE STEEL IN FIREPROOF HOUSES

Two experimental concrete houses, recently built in England, go the limit in fireproof construction. Concrete and steel are used exclusively, the floors being of jointless composition with rounded corners, while window frames, trimmings, doors, staircases, and even the cupboard shelves are of steel. The cottages are fitted with every modern improvement, and are said to have excelled similar dwellings of wood or brick, both in time and cost of construction.

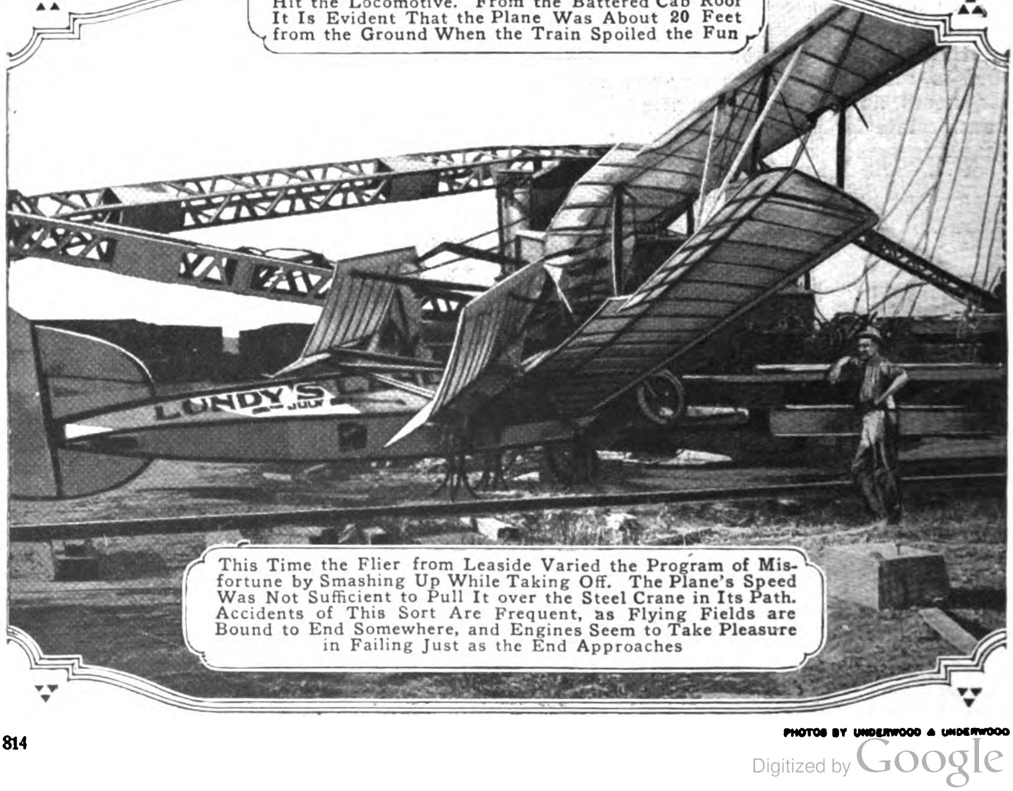


Not One Stick of Wood was Used in Building This Fireproof Residence. Its Walls, Floors, and Partitions Are Concrete, While Window Sashes, Doors, Trimmings, and Even Pantry Shelves Are Steel. At the Right is Shown a Steel Door Swung in a Frame of the Same Material

ACCIDENTS STILL ADD ZEST TO GREATEST SPORT



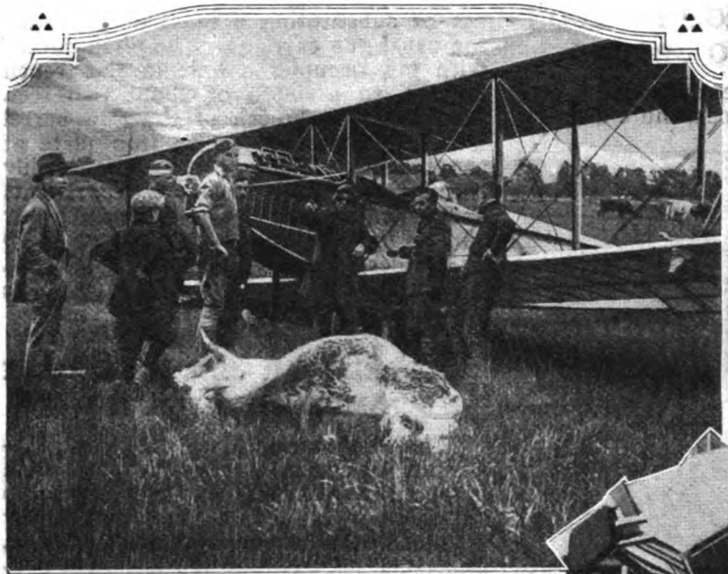
Remarkable Photograph of Airplane and Locomotive at Moment of Collision: A Cadet at the Leaside Aviation School, near Toronto, Canada, was Attempting to Land. He Swooped Too Low, and Hit the Locomotive. From the Battered Cab Roof It Is Evident That the Plane Was About 20 Feet from the Ground When the Train Spoiled the Fun



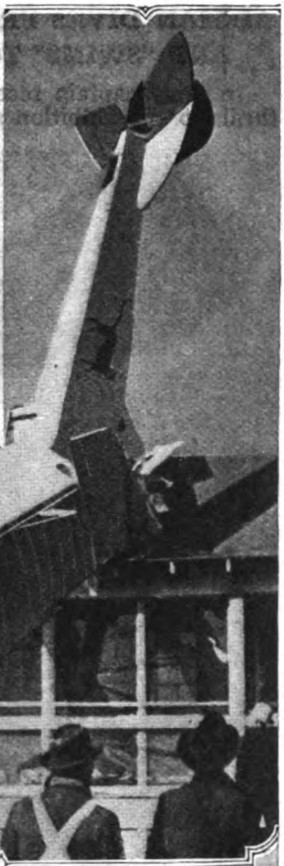
This Time the Flier from Leaside Varied the Program of Misfortune by Smashing Up While Taking Off. The Plane's Speed Was Not Sufficient to Pull It over the Steel Crane in Its Path. Accidents of This Sort Are Frequent, as Flying Fields are Bound to End Somewhere, and Engines Seem to Take Pleasure in Failing Just as the End Approaches

PHOTOS BY UNDERWOOD & UNDERWOOD

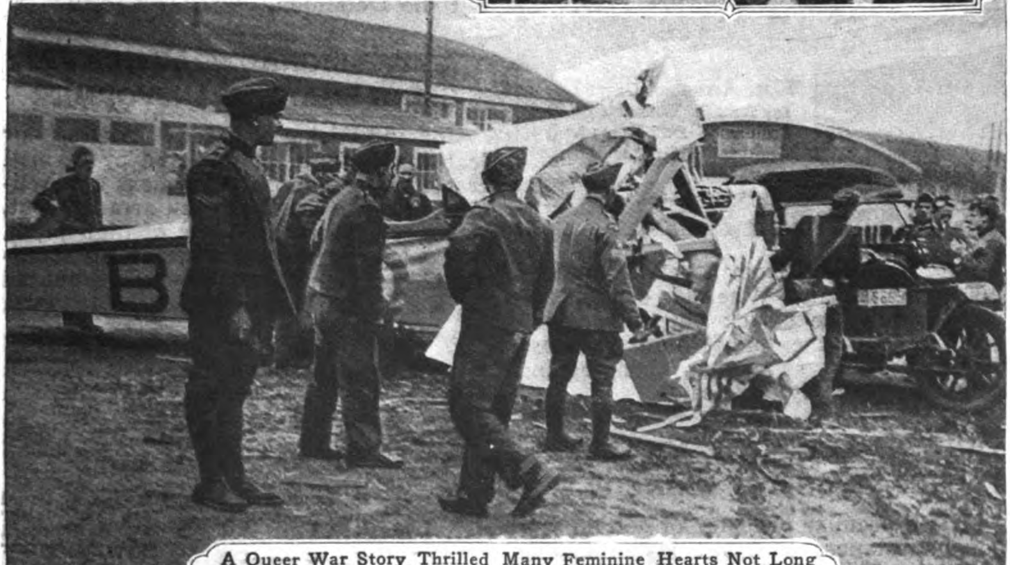
GRAVITATION CONTINUES TO BE AIRMAN'S FOE



This Airman was Forced to Land in a Pasture near Toronto, Canada; So He Turned Toreador, and Slew the Farmer's Bull. From His Gestures, It Is Possible That He is Explaining Just How the Whole Thing Was Really the Fault of the Stupid Bull



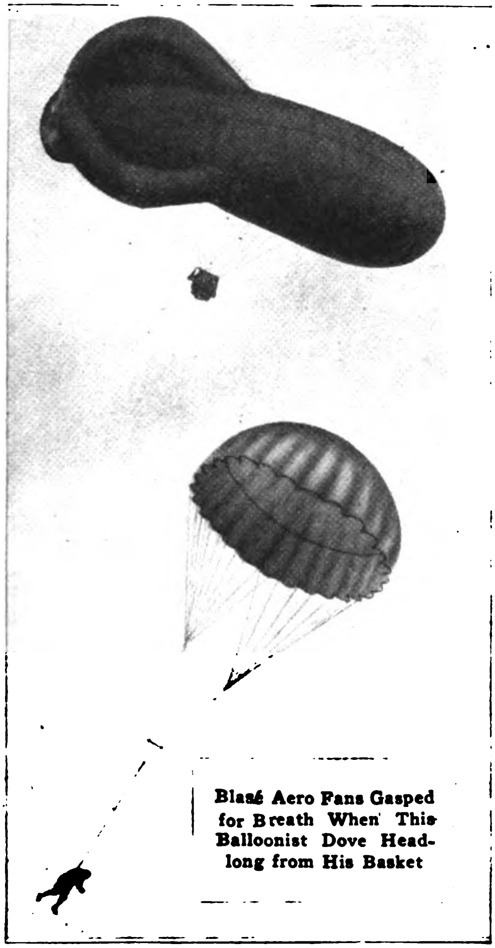
The Plane at the Right was Driven by Its Pilot Right through the Roof of a Texas Home, Wedging Itself into the Rafters So Tightly That Real Effort was Needed to Extract It before Repairing the House. A Telephone Pole Managed to Include Itself in the Mix-Up



A Queer War Story Thrilled Many Feminine Hearts Not Long Ago. It Told of a Luckless Airman Who Found He could Not Make His Plane Descend. He Drifted, the Story Went, Until Friends Rose and Rescued Him, Leaving the Airplane to Float On. Airplanes Always do Come Down, However. This Cadet Ruined the Post Commander's Auto When Landing from His First Flight

AIRMAN DIVES FROM BALLOON AND "SWIMS" TO GROUND

An army captain recently added a few thrills to an exhibition parachute drop by diving, head first, from a balloon basket, 2,000 ft. in the air. When his descent became steady, he struck out with hands and feet in the old-fashioned breast stroke used in swimming, changing his course appreciably, it is said.



Blasé Aero Fans Gasped for Breath When This Balloonist Dove Headlong from His Basket

QUEER MOUNT FOR ARTILLERY USES VISCOSITY PRINCIPLE

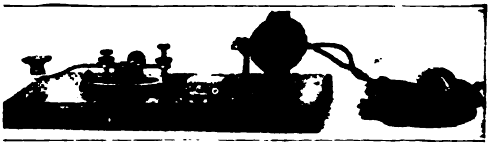
It is a peculiar property of certain viscous substances to resist instantaneous impulses, while yielding readily to gradually applied forces. A European inventor makes use of this principle in artillery construction, by the curious process of substituting a mass of pitch for the usual gun carriage. The pitch, mixed with tar, occupies a hole in the trench bottom, to a depth of about two feet. Into this, the breech of the gun barrel is inserted, resting on an iron plate at the bottom. While the gun is readily turned to any range position, experiments demonstrated that it was not perceptibly thrown out of line by the firing of 20 projectiles, representing nearly 200 lb., its accuracy remaining unimpaired. The earth absorbed all the recoil.

CRIPPLED WAR VETERANS FORM "AMPUTATION CLUB"

"The Amputation Club of British Columbia" has been legally incorporated in Vancouver, and now has a membership of 90 men, who have all been so severely wounded overseas that amputation of one, and sometimes two, limbs has been necessary. The strange club meets twice a month to consider the furtherance of its object, which is the procurement of the most satisfactory artificial limbs on the market. Its most interesting activity so far has been the publication of a Christmas booklet, "The Gold Stripe," which is to be followed, toward the last of this May, by a second volume featuring the soldiers' own stories, illustrated and supplemented by artists and authors throughout the Dominion.

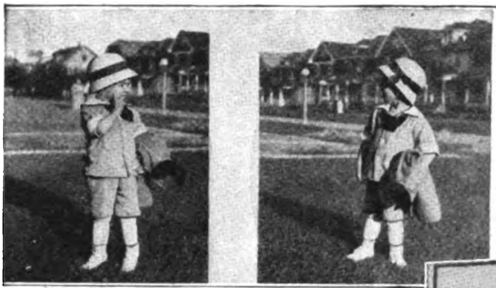
BUZZER-SIGNAL PRACTICE SET USING SMALL TRANSFORMER

For practicing buzzer signaling or learning code, a set operated by a small transformer is more convenient and reliable than the usual dry-cell arrangement. A telegraph key, a buzzer of high pitch, and a bell-ringing transformer, all standard electrical supplies, are easily mounted on a baseboard and connected to form such a set. The alternating transformer current produces a better signaling tone than battery current.

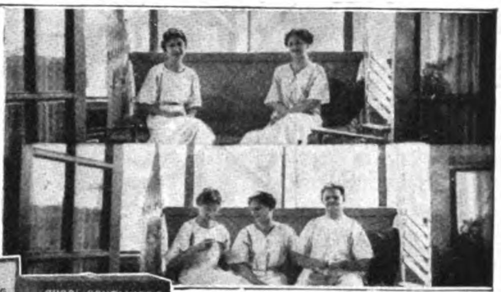


Buzzer-Signal Practice Set, in Which the Usual Battery is Replaced by the Bell-Ringing Transformer on the Right End of the Baseboard: A Standard Telegraph Key and a Small, High-Pitched Buzzer Complete the Set

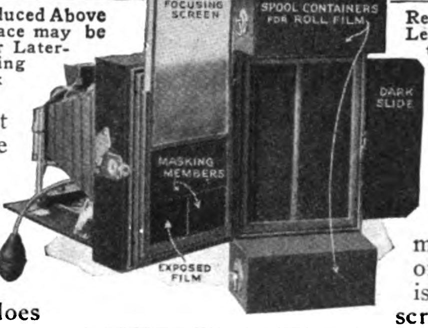
MANY PICTURES ON ONE FILM IN NEW CAMERA



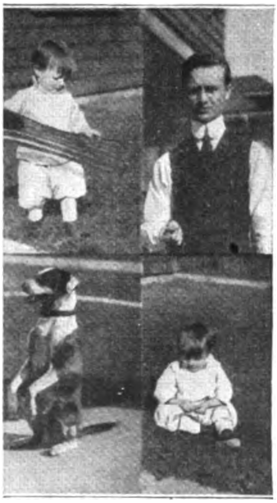
The Two Sample Films Reproduced Above Indicate How the Film Surface may be Divided into Two Parts, Either Laterally or Longitudinally, by Using Either Part of the Double Mask



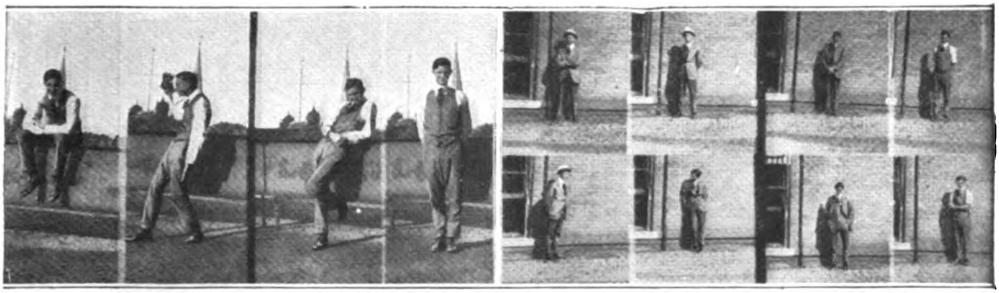
Rear View of the Camera at the Left, Shows the Film Chamber at the Back Open, Revealing the Screen, the Masks, and Exposed Part of Film



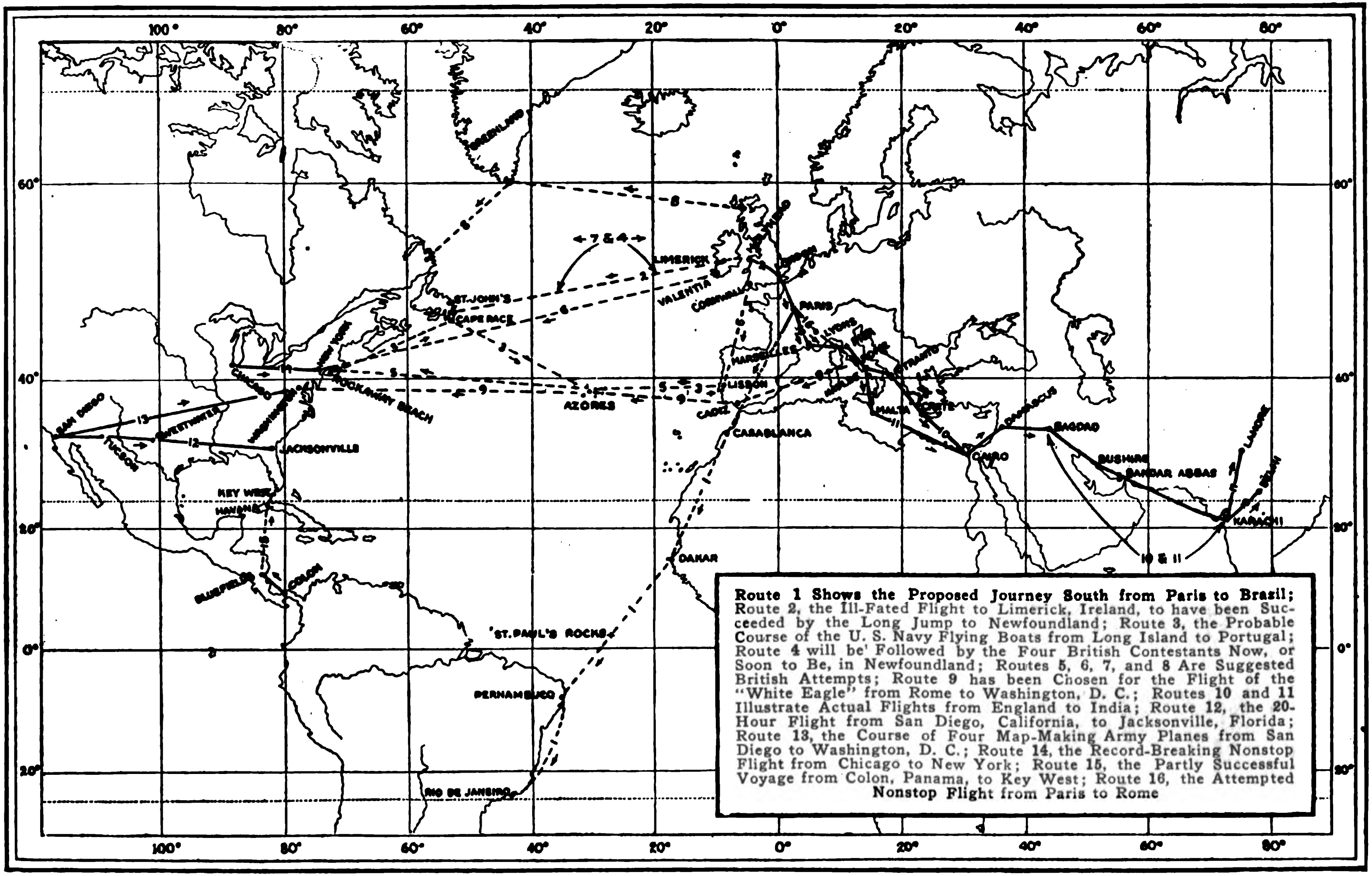
As many as eight, out of the hundreds of cute things baby brother does, can be recorded on a single film surface with a Rochester, N. Y., inventor's new camera. In appearance, the instrument does not differ materially from the familiar folding, roll-film, hand camera. Inside, however, are some novel features. The whole back, including the film-spool chambers at the ends, opens on a hinge to give access to the interior, the film then being protected by a slide like those used in plate holders. In front of the film is a sliding mask in two layers, each of which has exposure openings of certain size and shape. By adjusting the relative position of one to the other for each exposure, pictures one-half, one-fourth, or one-eighth the size of the full surface are taken in succession. There is also a focusing screen, which automatically takes the place of the film when the back is opened. Both mask and screen are readily removable, when the device becomes an ordinary camera. The focusing screen, of course, may be used equally well with or without the mask, assuring clean sharp pictures.



¶Unusual for its location is the vocational school being conducted 14,000 ft. underground in an Idaho mine, chiefly for returned soldiers who are learning the elements of mining in this most practical way. Instruction in operating air compressors, and like tasks, however, is given above ground.



Centered Above Is the Usual Quadruple Division of Film. At the Left It is Seen Divided Laterally into Four Panels, While the Right-Hand Picture Indicates the Maximum Number, Eight, of Exposures on a Single Film Surface



Route 1 Shows the Proposed Journey South from Paris to Brazil; Route 2, the Ill-Fated Flight to Limerick, Ireland, to have been Succeeded by the Long Jump to Newfoundland; Route 3, the Probable Course of the U. S. Navy Flying Boats from Long Island to Portugal; Route 4 will be' Followed by the Four British Contestants Now, or Soon to Be, in Newfoundland; Routes 5, 6, 7, and 8 Are Suggested British Attempts; Route 9 has been Chosen for the Flight of the "White Eagle" from Rome to Washington, D. C.; Routes 10 and 11 Illustrate Actual Flights from England to India; Route 12, the 20-Hour Flight from San Diego, California, to Jacksonville, Florida; Route 13, the Course of Four Map-Making Army Planes from San Diego to Washington, D. C.; Route 14, the Record-Breaking Nonstop Flight from Chicago to New York; Route 15, the Partly Successful Voyage from Colon, Panama, to Key West; Route 16, the Attempted Nonstop Flight from Paris to Rome

MANY TRANSATLANTIC FLIGHT PROJECTS KEEP WORLD'S EYES ON AIRMEN MAKING GREAT VENTURES

JUST as a few years ago the whole world waited agape to hear what fate should befall the persistent Bleriot in his cross-channel flight from Calais to Dover, so for the past few weeks has it awaited the outcome of the proposed transatlantic flight. Much of the thrill of the earlier feat, of July 25, 1909, is absent from the present project. Airplanes within the brief intervening period have been established on a more matter-of-fact basis—so much has been accomplished with them that few are doubtful that whatever within reason man wills to do in this connection will come to pass.

However, it is a most interesting situation to have at the same time so many contestants equipped and poised for the great adventure. Already several have essayed flight and met disaster. But, at the present moment (April 25), Hawker and Raynham, at St. John's, Newfoundland, still chaff each other in friendly spirit while both chafe at the unsettled weather conditions that delay the exploit. On the Atlantic coast the U. S. Navy quietly proceeds with its important preparations. No boasting has come from this quarter, and no entrance for the great purse has been made, it is understood; and probably, should the Navy's plane be the first across, the world would require a few hours to assimilate its surprise. However, the Navy has a name for achievement, which it is well to keep in mind.

While a number of British plane attempts are promised, we hear only a rumor now and then of what they hope to do with the dirigible. Our chart, on the opposite page, makes no accounting of recent dirigible flights, as but few have been traced in detail. However, when we remember that one British machine has remained in the air over 100 hours, it is safe to harbor expectation. The thousands of people who built these craft are staking their hopes on them. When a great venture lies close to the hearts of the masses there is either a menace or a promise of results.

As this magazine goes to press we are on tiptoe with expectation. We could prophesy—we might even luckily guess the outcome. The project is too momentous for such trifling! We only assert that every sincere birdman who wisely equips himself and essays the transatlantic flight—though he meet with sheer failure—is entitled, through his very intrepidity, to share the laurels of the victor.—Editor.

TWO airmen have already failed in the transatlantic race. One, a lieutenant in the French service, has started three times from Paris, intending to follow route 1 (5,500 miles, approximately, as other distances hereafter given), which should lead him from Paris to Casablanca, to Dakar, thence to St. Paul's Rocks in mid-Atlantic, to Pernambuco, and finally to Rio de Janeiro, Brazil.

Another failure was that of an English major on April 18, 1919. He intended to take route 2 (2,500 miles), from the vicinity of London to Limerick on the west coast of Ireland, whence he planned to make the long leap to Newfoundland. His single-motored Short biplane was distinguished by a huge, streamlined gas tank, slung like a torpedo under the fuselage. Trouble developed, however, and he was forced down off Holyhead, Wales, in the Irish Sea. He and his companion were rescued, and the plane salvaged by a destroyer.

Our own naval fliers hope to leave Rockaway Beach, L. I., for the Newfoundland jump-off early in May. Their itinerary up the coast to Newfoundland has been carefully plotted, but their ocean route is still rather problematical. It is likely, however, that route 3 (3,500 miles) will be followed, taking the Americans from Cape Race to the Azores, and from there to some European port, possibly Lisbon. From the four flying boats, NC-1, 2, 3, 4, which are being groomed for the trip, will be selected the two which will actually start. These planes are driven by three or four Liberty motors, are equipped with wireless telegraph and telephone, and in flight will carry a pilot-commander, two duty pilots, one engineman, and one radio operator. The navy will safeguard the fliers in every way, and has detailed one ship for every hundred miles of the route, with sub-chasers to patrol the intermediate areas.

All the British contestants now active seem to prefer route 4 (2,000 miles) which involves more or less straight going from Newfoundland to Ireland. The "Felixstowe Fury," now on its way to Newfoundland, will be piloted by Colonel Porte, R. A. F., remembered in the United States as the designer of the "America" of 1914. His ship is a large triplane with a wing spread of 120 ft., and driven by five motors at a speed of 105 miles an hour. The colonel will be assisted by a crew of five or six men, and will keep his course with directional wireless.

The Handley Page converted bomber should reach Newfoundland early in May. It is driven by four engines and carries about 2,000 gal. of gasoline, enough to keep it in the air perhaps 25 hours. Scores of workers are now building a hangar and grading the aerodrome, 90 miles north of St. John's.

Two other British teams have nearly completed their preparations for the dash from Newfoundland to Ireland. In both cases the exact route is still rather uncertain, as each will depend on the weather encountered. Mr. Hawker will fly a Sopwith two-seater biplane with a wing spread of 46 ft. 6 in., and driven by a single motor. He plans to release the whole undercarriage when a few miles out at sea, and will carry a lifeboat on the fuselage.

Captain Raynham, on the other hand, is making scarcely any provision for a drop into the water, as he is confident that the dash can be made without accident. He will pilot a Martinsyde biplane, similar to the fast British scout of that name, which can develop a maximum speed of 130 miles an hour with tanks full.

Although the four British teams mentioned all intend to take a more or less direct trip to Ireland, several other itineraries have been plotted, viz., route 5 (4,000 miles) from Cornwall, via Lisbon and the Azores, to New York; route 6 (3,000 miles), from Ireland to New York; route 7 (2,000 miles), from Ireland to Newfoundland, and route 8 (2,000 miles), from Scotland, via Greenland, to Canada.

Active preparations are also being made for the voyage of Caproni, in his giant "White Eagle," along route 9 (4,500 miles), from Rome, via Cadiz and the Azores, to Washington, D. C. This great triplane is driven by five motors, and is reported to have a roomy cabin which will accommodate several passengers.

Among flights actually made, are the two voyages by Handley Page machines from England to India. The first, along route 10, started at London, touched at Paris, Marseilles, Naples, Crete, and at Cairo was interrupted to allow the plane to operate against the Turks in Palestine, where it helped to bring the campaign to its successful close. Then it visited Damascus, Bagdad, Bushire, Bandar Abbas, Karachi, and Delhi. The second voyage along route 11, was made over practically the same country, starting on Dec. 13, 1919, at about the time the first flight was being completed, and ending at Lahore on Jan. 16, 1919. Both these flights covered a distance of approximately 7,000 miles.

Three performances by American airmen deserve attention also. The first was a trip along route 12, from San Diego, Calif., to Jacksonville, Fla., made in less than 20 flying hours by an American major in a De Haviland battleplane, at an average speed of 137 miles an hour. The major made a nonstop flight from Tucson, Ariz., to Sweetwater, Texas, a distance of 880 miles by the route followed.

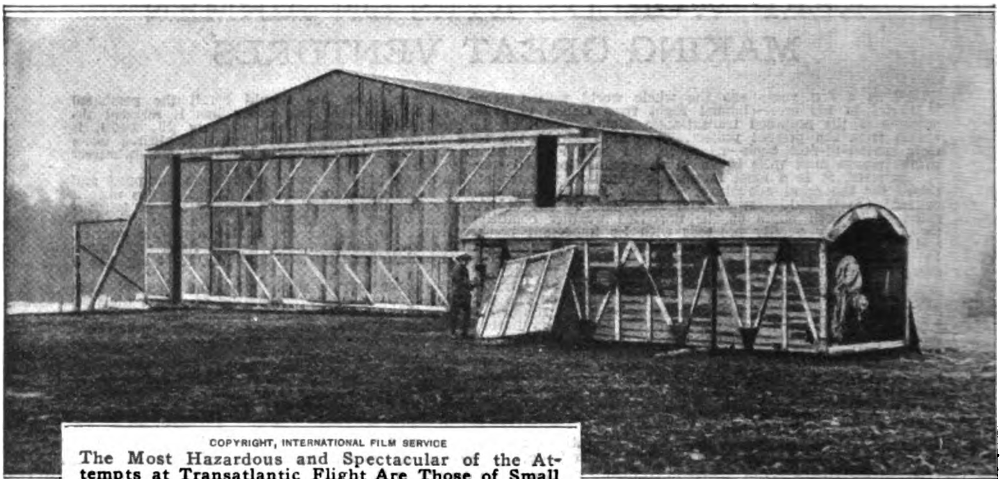
The second, along route 13, was likewise from San Diego, but was made by four army planes, and terminated at Washington, D. C. The trip was made between Dec. 4, 1918, and Jan. 6, 1919, for the purpose of mapping a southern air route through the United States. Only 50 hours of this time were actually spent in flying, however, which shows an average speed of 80 miles an hour for the 4,000-mile journey.

The third was the nonstop flight over route 14 from Chicago to New York, accomplished on April 19, 1919, by an American captain in a De Haviland battleplane, at an average speed of 106 miles an hour. The captain flew at an elevation of 10,000 ft. and was able to make the eastern city in 6 hr. 50 minutes.

Another government plane left Colon, Panama, on April 12, 1919, for Key West, over route 15. The seaplane reached Bluefields, Nicaragua, in five hours, but on leaving Bluefields encountered trouble, and is reported to have abandoned the flight.

One other flight to receive attention lately was that of Jules Védrines, the veteran French airman, who left the vicinity of Paris on April 21, 1919, attempting a nonstop flight to Rome, by route 16 (700 miles). His twin-engined Caudron fell south of Lyons, France, killing both Védrines and his mechanic.

AIRMEN PREPARE FOR TRANSATLANTIC CROSSING



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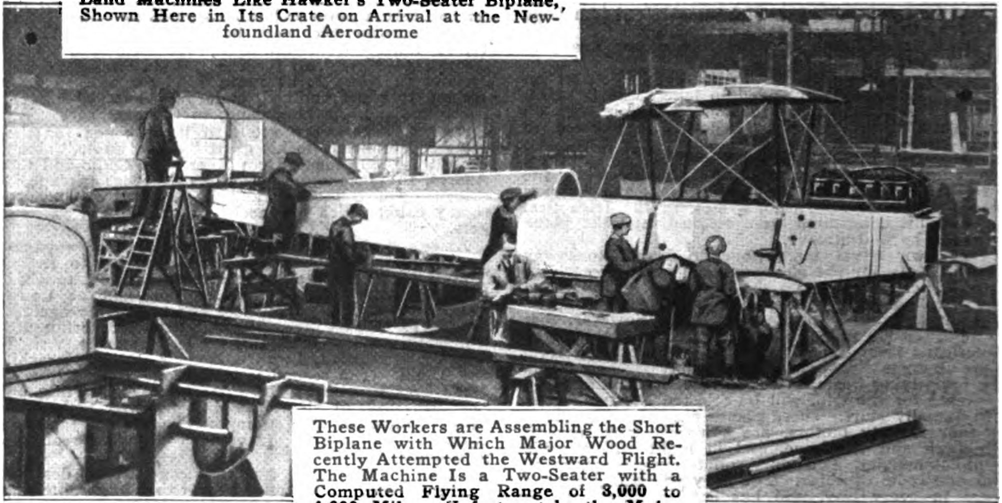
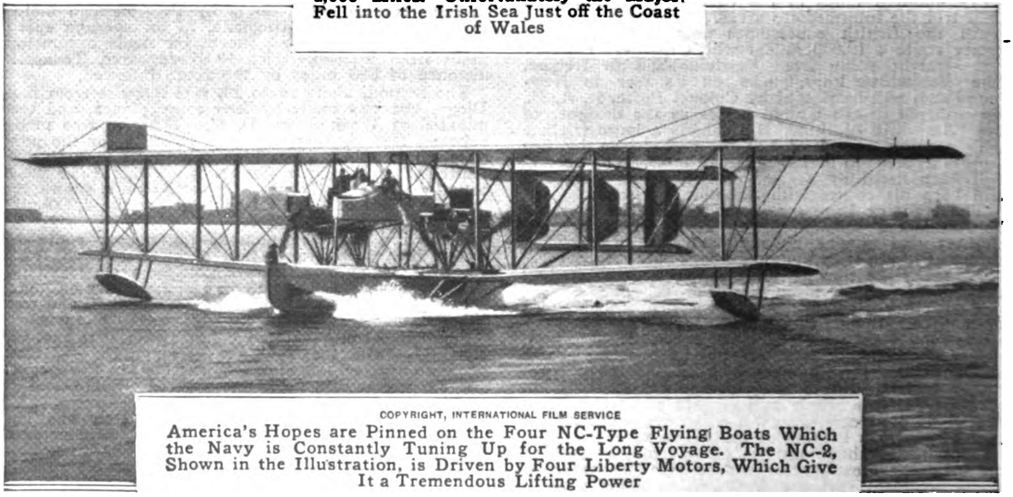
The Most Hazardous and Spectacular of the Attempts at Transatlantic Flight Are Those of Small **Land Machines Like Hawker's Two-Seater Biplane,** Shown Here in Its Crate on Arrival at the Newfoundland Aerodrome



These Workers are Assembling the Short Biplane with Which Major Wood Recently Attempted the Westward Flight. The Machine Is a Two-Seater with a Computed **Flying Range of 3,000 to 4,000 Miles. Unfortunately the Major.** Fell into the Irish Sea Just off the Coast of Wales



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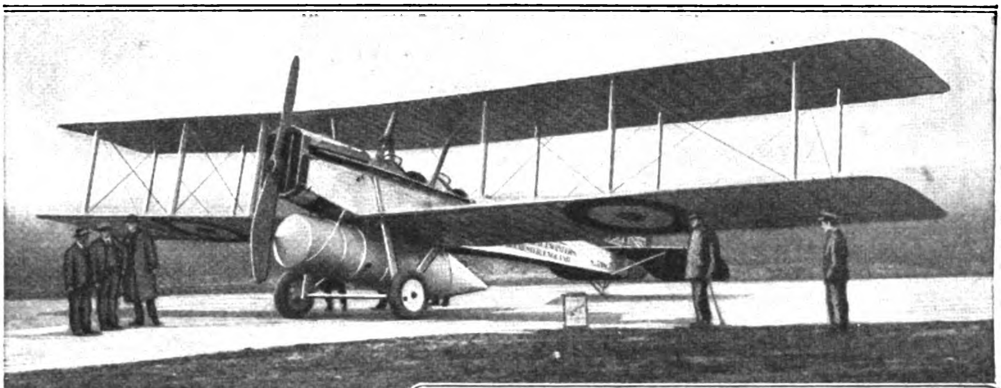
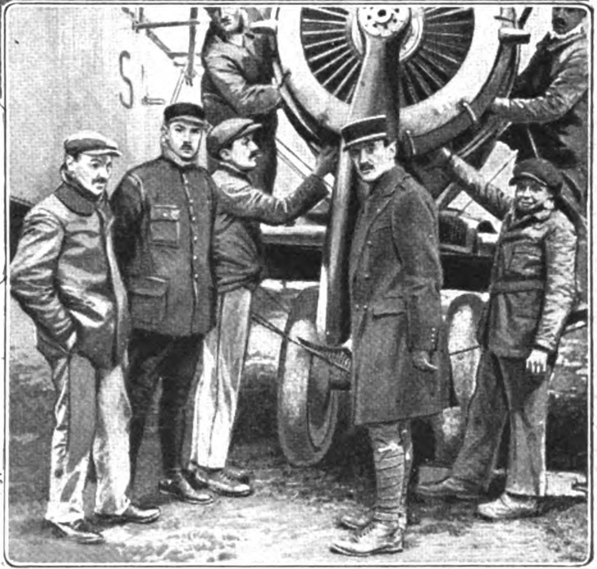
America's Hopes are Pinned on the Four NC-Type Flying Boats Which the Navy is Constantly Tuning Up for the Long Voyage. The NC-2, Shown in the Illustration, is Driven by Four Liberty Motors, Which Give It a Tremendous Lifting Power

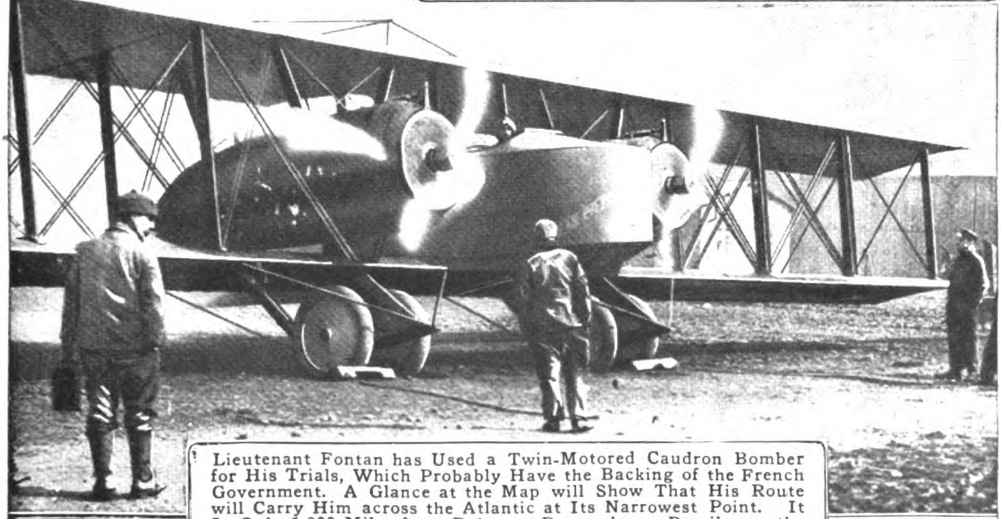
UNDAUNTED BY DISASTERS ALREADY ENCOUNTERED



This Is the Biplane That Fell into the Irish Sea on One of the First Transatlantic Attempts. Its Most Peculiar Feature Is the Great Gasoline Tank Slung under the Fuselage, So That It might be Emptied to Serve as a Pontoon in Case of Forced Landing in the Water

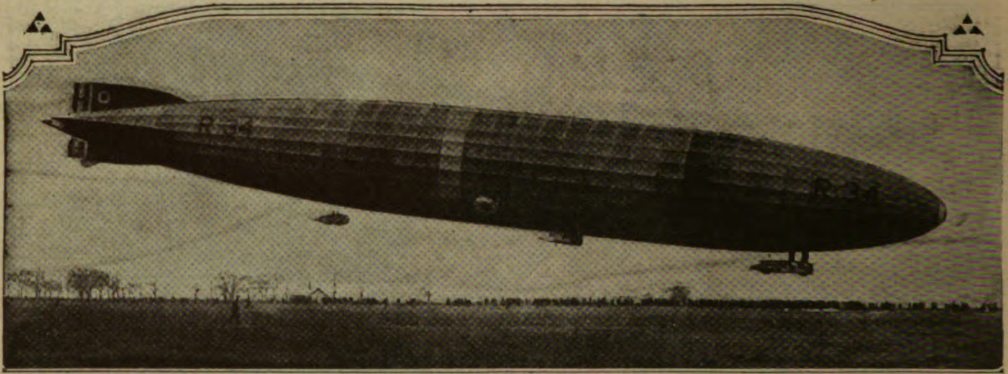


Lieutenant Fontan, Standing beside the Propeller at the Right, has Three Times Attempted to Bring the Laurels to France. His Projected Route will Carry Him South from Paris, along the West Coast of Africa, to Cape Verde, from Where He will Try the Flight to Brazil with a Mid-Ocean Stop at St. Paul's Rocks



Lieutenant Fontan has Used a Twin-Motored Caudron Bomber for His Trials, Which Probably Have the Backing of the French Government. A Glance at the Map will Show That His Route will Carry Him across the Atlantic at Its Narrowest Point. It Is Only 1,800 Miles from Dakar to Pernambuco, Brazil, over the Steamship Route

TWO NEW DIRIGIBLES ARE ENGLAND'S LARGEST



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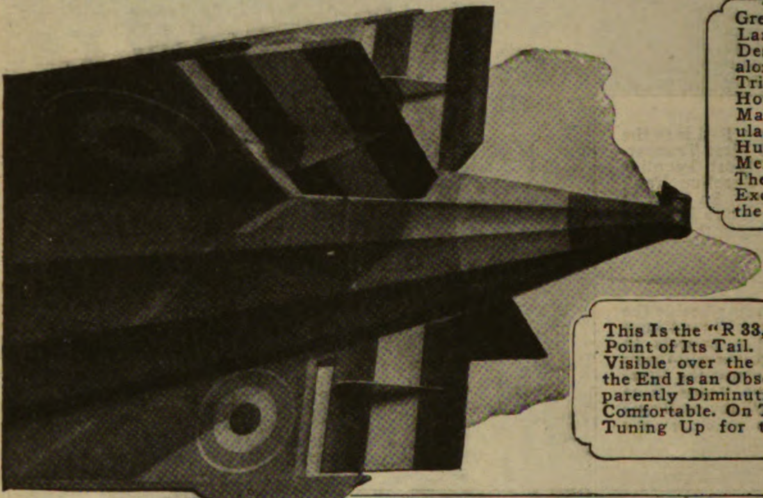
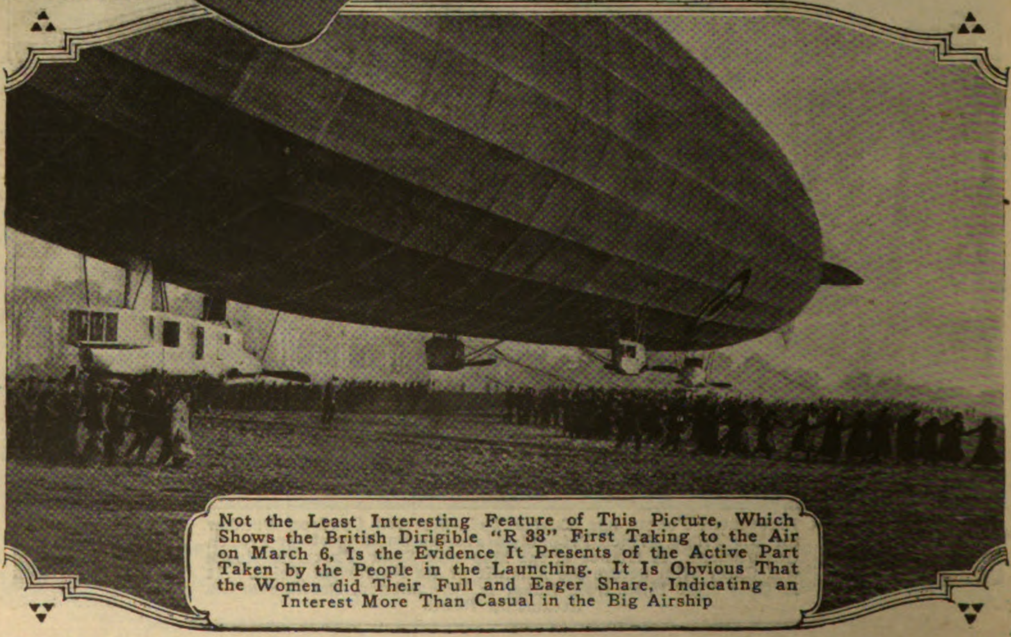
Great Britain's Newest and Largest Dirigible, the "R 34," Descending in the Fields along the Clyde after Its Trial Trip of Four and a Half Hours: The Launching, on March 14, Was a Great Popular Event, and Over Four Hundred Spectators, Both Men and Women, Assisted. The "R 34" Is 670 Feet Long, Exceeding Its Sister Ship, the "R 33," by a Few Feet



This Is the "R 33," or Rather the Extreme Point of Its Tail. The Minute Object Just Visible over the Edge of the Cockpit on the End Is an Observer, Who Finds the Apparently Diminutive Quarters Roomy and Comfortable. On This Trip the "R 33" was Tuning Up for the Transatlantic Trials



Not the Least Interesting Feature of This Picture, Which Shows the British Dirigible "R 33" First Taking to the Air on March 6, Is the Evidence It Presents of the Active Part Taken by the People in the Launching. It Is Obvious That the Women did Their Full and Eager Share, Indicating an Interest More Than Casual in the Big Airship

These Motorcyclists have Left Sydney, Australia, for London, England. They are to Make a Rough Survey for an Aerial Mail Line between Those Cities. All Supplies for the Dangerous Trip, Including a Well-Stocked Medicine Chest, a Generous Gasoline Reserve, and Plenty of Revolver Ammunition, are Carried in the Sidecars

MOTORCYCLE PARTY SURVEYS LONG AIR ROUTE

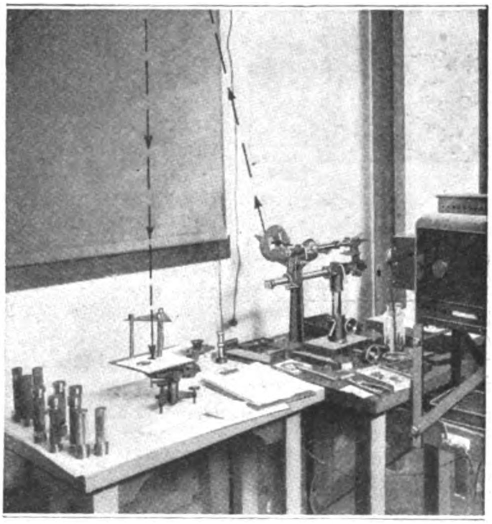
An expedition of six men, riding motorcycles and carrying their supplies in sidecars, has left Sydney, Australia, for London, England, in an effort to survey a route for an aerial mail line that is being backed by a commercial company. To handle the many problems that will arise during the hazardous journey, the company has chosen six men of various professions, among them a journalist, a French airman, an expert mechanic, and a surveyor and photographer. These men hope to locate suitable landing fields about every 300 miles along the long trail, that will lead them north through New South Wales, across 500 miles of sand in the Northern Territory, over the islands of Timor, Java, and Borneo, to Singapore; thence up the Malay Peninsula, and west across India and Persia to Suez, where the party will board ship for London. The motorcycles being used are standard models, with only a few alterations made for the difficult roads that will be met. Springs have been strengthened, gasoline and oil tanks enlarged, and the gear ratio somewhat reduced.

ARMY'S RECONSTRUCTION WORK PERMANENTLY RECORDED

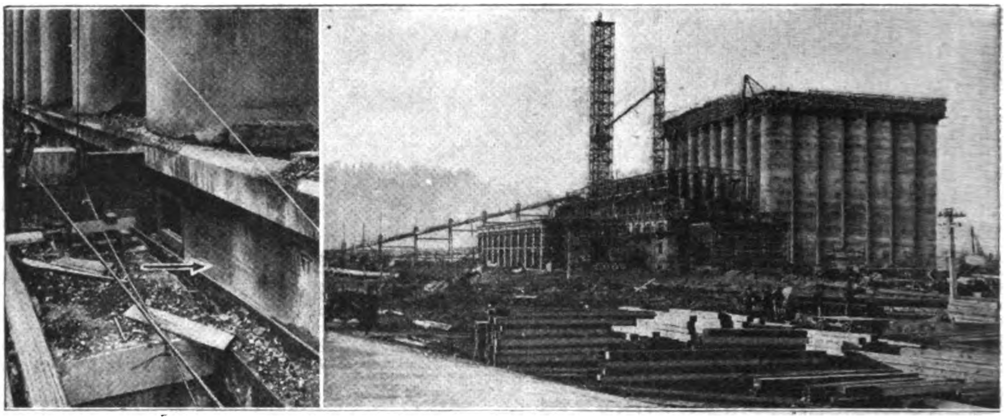
In order to conserve and apply the valuable lessons learned at the army's many physical-reconstruction hospitals, it is now required that the chief educational officer in each institution prepare a historical sketch, showing the growth of the work by accurate details and figures. These records of knowledge gained and methods established are to be filed by the government as a permanent aid to civil as well as military hospitals.

PROJECT PICTURES TO TEST SCREW-THREAD ACCURACY

Exact accuracy was a stringent requirement for all of the thousands of screw-threaded parts used on war equipment. The threads were tested by the ingenious method of projecting a magnified picture of them on a screen. The screen itself was a small horizontal metal stand, provided with a vernier adjustment. A straightedge, rigidly supported above the stand, cast a shadow on the screen at the correct angle for comparison. The light rays from the projecting lantern were turned upward by a prism, and a mirror on the ceiling directed them down to the screen. The screw to be tested was supported just behind the objective lens.

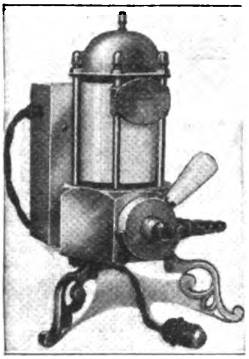


Method of Projecting Screw-Thread Images for Test Measurements: The Screw Is Back of the Objective Lens to the Right in the Picture, and the Light Rays, Directed Upward by a Prism, are Reflected Back to the Screen Instrument to the Left by a Ceiling Mirror, Not Shown



The Great Weight of the Concrete Grain Elevator Shown in the Larger Picture Caused It to Sink 13 Inches. The Smaller Building Which Shelters the Power Plant did Not Sink, However, So the Reinforced-Concrete Connections between the Two had to be Cut, as in the Picture to the Left

SMALL WATER HEATER CAN BE PACKED IN TRAVELING BAG



A small electric water heater, only 12 in. high, is now manufactured for attachment to a kitchen or bathroom faucet, directly or with a rubber tube. The water then flows through porcelain tubes in which noncorrosive resistance coils heat it progressively to the required temperature. The faucet from which the heated water is finally drawn is so associated with the electric snap switch that the current is not turned on until the hot water is actually wanted. If cold water is desired, the faucet handle is thrown in a reverse direction, causing the water to flow through an unheated by-pass. The machine can heat about 30 gal. an hour, using either direct or alternating current.

CONCRETE GRAIN ELEVATOR SINKS THIRTEEN INCHES

When it was decided to construct a municipal grain elevator of 63 bins at Portland, Ore., weighted piles were driven on the site selected to determine the nature of the ground. At the end of four weeks no settling was discovered, and construction was begun. But when the heavy bins had reached their final height of 85 ft., the structure began to sink, rapidly at first, then slowly, stopping at a depth of 13 in. Experts were called who found that the sinking would not continue; so work recommenced. The structure is now four inches out of level, however, and the reinforced-concrete belting tunnels had to be cut to prevent damage to the adjoining building, which houses the power plant.

INSOMNIA TREATED BY DEVICE SUPPLYING WARM, DRY AIR

An English scientist declares that insomnia may be cured by removing excess moisture from the lungs. To put his theory into practice, he has devised a small machine for supplying warm, dry, filtered air, which the patient then breathes through a nose tube secured to the head with tape. The process is said not to be uncomfortable.

This Year Every Facial Attachment Suggests Dangers of Gas or "Flu," but This One will be More Willingly Worn by Those Who Need It. It Is a Device for Warming, Drying, and Filtering Air for the Treatment of Insomnia

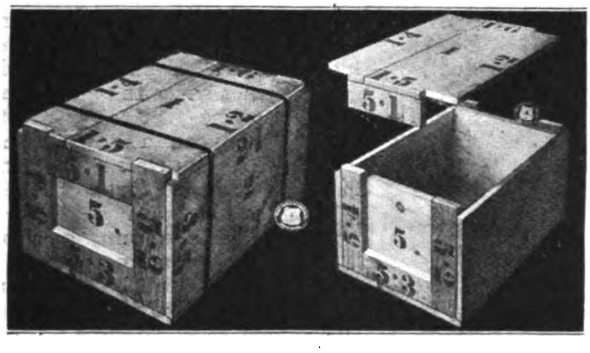
BETTER PACKAGES AND HOW THE WAR BROUGHT THEM OUT

By BRANDON TRACY

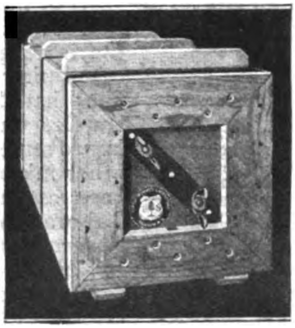
"$*!&%!No.!!"

Call this low-spoken, earnest expletive "Oh, fudge!" if you will. In civilian life the latter usually suffices. It is not the way men talk at 3:00 a. m. in the firing bays, with the big push against the Germans due at 3:18, zero hour—and the hand-grenade boxes for the whole platoon still tightly nailed. What Eugene Field called "virile Anglo-Saxon that would never do in print" is tried out, and usually found wanting.

In this particular instance men were required to open and unpack grenade boxes, distributing the contents among the bombers, and do it all without arousing the suspicion of Fritz's sentinels, 60 yards away. One squeak of a rusty nail being drawn, and the attack would fail, in all probability. Little hints of this kind are given full valuation in the trenches just before dawn.



The Hand-Grenade Box at the Left can be Opened in a Dark Trench without the Slightest Noise to Betray the Coming Attack. At the Right the Binding has been Cut



This Hand-Grenade Box is Likewise Easily and Silently Opened. In This Case, the End is Held with Bolts and Screws

The boxes never were opened that day. Though a dozen men sweated and swore because the work had not been done earlier, there was no chance of accomplishing it without noise. Each time one of the boards of a cover was pried, it gave a warning squeak that made the worker stop, cold beads of perspiration standing out on his forehead. The platoon "went over" with practically no bombs at all.

A report of this incident came back through official channels, and the Forest Products Laboratory, at Madison, Wis., was given the problem of designing packing cases for ammunition that could be opened anywhere on the road to Berlin without disturbing the most suspicious Boche. Immediately two designs of boxes were presented. The first had a bolt-and-screw end construction; when the screws were removed the end came off noiselessly, revealing the contents. The second was of slightly stronger design, intended for heavier contents. No nails or bolts were used; the top dovetailed with the edges and was held down by two tight strips of iron sheeting passing entirely around the box. Noiseless clippers for this sheeting made it possible to unpack this box anywhere, and its strength could be depended upon. The two designs were adopted at once, and used for the duration of the war.

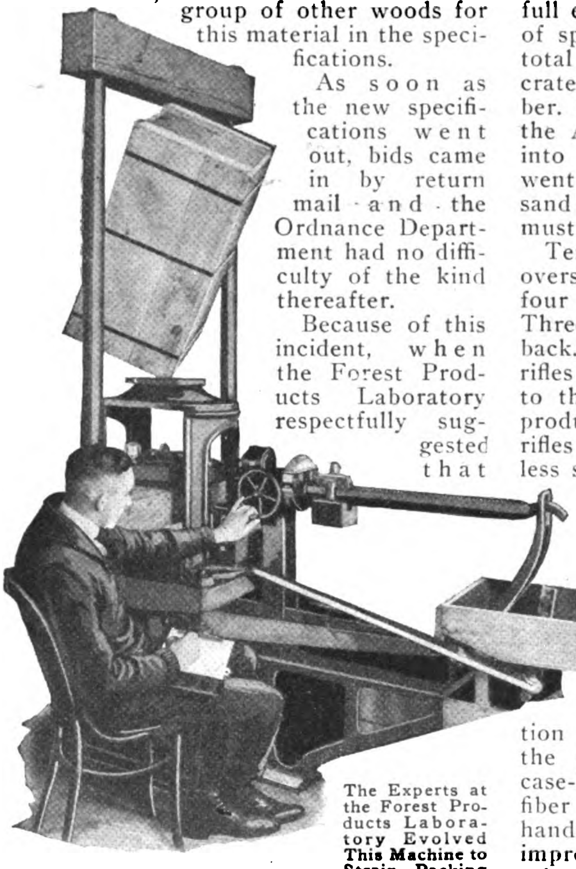
On the eve of hostilities with Germany, the wood experts of the Forest Products Laboratory offered to help out the Ordnance Department of the United States Army in providing containers for overseas shipping. This was declined politely. The Ordnance Department considered the problem of getting boxes merely a question of getting sufficient money to spend.

On April 7, 1917, it sent out specifications for several types of boxes needed immediately, asking for bids. The contracts would have involved $3,000,000. Two weeks later the Forest Products Laboratory was summoned in consultation. Not a single bid had been sent in by box manufacturers!

The forest-products expert detailed to the problem found that the box specifications called for white pine, and also that the sizes named made it necessary for manufacturers to desert their long-established practice of making boxes from waste ends of lumber. The new boxes would have to be constructed from new lumber, if at all. He simply redesigned the containers, altering the specifications so that waste ends could be used; and knowing that the United States just then was suffering from a bad shortage of white pine, he substituted a group of other woods for this material in the specifications.

As soon as the new specifications went out, bids came in by return mail and the Ordnance Department had no difficulty of the kind thereafter.

Because of this incident, when the Forest Products Laboratory respectfully suggested that much space could be saved for the government by redesigning all the other boxes used in overseas shipping, the experts were allowed to tackle the new problem.



The Experts at the Forest Products Laboratory Evolved This Machine to Strain Packing Cases in All Directions. If a Box Survives This Test It will Travel Safely under Any Conditions. The Machine is Here Shown Submitting a Box to a So-Called Cornerwise Compression Test

The first box changed carried 30 one-pound cans of saddle soap abroad. The new design saved 43 per cent of the cargo space required by the old box—cargo space cost the government $6 a cubic foot throughout the war—and made a stronger, though lighter and less expensive, container. On the first shipment of 3,000,000 lb., the government pocketed a saving of $414,000 net.

All the powder and high-explosive boxes suffered alteration. Of these, the best example is the container which carried 140 lb. of cannon powder. Fourteen per cent in space was saved.

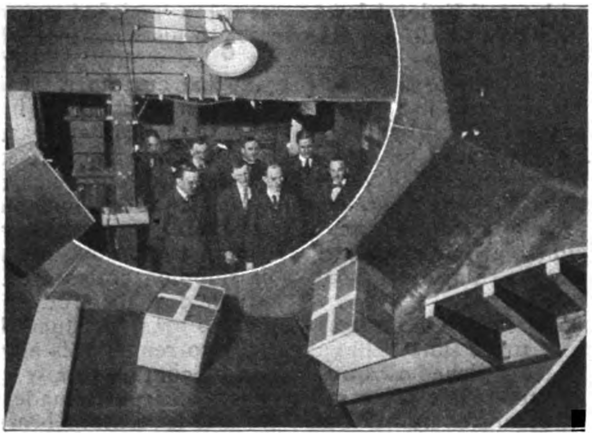
One container intended to hold two Browning automatic machine guns with full equipment was found to be wasteful of space. Twenty-eight per cent of the total it required was eliminated, and the crate made at a saving of 40 cents in lumber. Every time two of these rifles crossed the Atlantic, Uncle Sam put back $5.77 into his breeches pocket. As the guns went over at the rate of nearly a thousand a day for several months, his pocket must have bulged.

Ten infantry rifles, model 1917, went overseas in a single crate. Approximately four million in all were shipped abroad. Three million or more will be shipped back. Each single trip of one million rifles saves the government $1,500,000, due to the fact that forest-products experts produced a new crate that housed the rifles with an apportionment of ¼ cu. ft. less space for each.

In addition to the great amount of money saved in this manner, there is a still larger sum to be mentioned. After the boxes designed by the Forest Products Laboratory were put in use, the losses from breakage suffered by the government were less than 15 per cent what they had been previous to the adoption of the new boxes. In all, adding the savings made by new waterproof case-lining paper, by the introduction of fiber handles to take the place of rope handles on ammunition cases, by various improvements on strapping, seals, and on other minor accessories and details, it has been estimated that the Forest Products Laboratory saved upward of $30,000,000 of government money—more than enough to justify the existence of the organization till eternity, even if not another stroke of work ever were done by the organization.

The laboratory, however, is only at the threshold of its usefulness. In the period of reconstruction now before us, considering the phase of box construction alone, the organization stands ready and able to save for industry in the United States and export shipping at least $10,000,000 a year. This money will be put back into the pockets of the box manufacturers and box users; every shipper who sends anything in a container made of wood, paper, or fiber will benefit, and indirectly, every consumer of products thus conveyed will save money.

As a striking example of how this saving will be accomplished stands the case of electric lamps. Recently a manufacturer decided that the boxes in which lamps were sent to jobbers were inefficient and wasteful. Approximately nine per cent of the lamps were either smashed, or jarred until the filaments were broken. The company consulted the experts of the laboratory, who advised that a shipment of $4,000 worth of lamps be sent up, with some standard containers, for test.



A Group of Electric-Lamp Manufacturers Wanted to Find a Packing Case That would Deliver Their Fragile Products Intact to the Customer. The Revolving Drum Shown Above Made the Tests

The boxes, together with some designed at the laboratory for this use, were given the compression-along-edge, cornerwise, and drop tests. The first, as its name implies, is a steady and constantly increasing pressure applied along any edge, and with the opposite edge in direct line with the pressure exerted. One of the illustrations shows the machine for this test and how it is used. The same machine is used for the cornerwise test, which really is the same, except that the force is exerted on two opposite corners instead of edges. Combined, these two measure the strength of the box in withstanding any external pressure, and approximate the hazard suffered by lower tiers of boxes in a pile.

The drop test is given by means of a huge hexagonal revolving drum, rotating slowly. The box is packed with its actual contents, as in commercial service, and placed in the drum. On the inside faces of the drum is arranged a series of hazards, which causes the box to follow a regular cycle of drops, falling on sides, top, bottom, edges, corners, and flat upon a sharp projection similar to the corner of another box. With the two former tests, this gives a box all the hazards it encounters in actual service anywhere.

The lamp boxes were found to be insufficiently insulated against shock for their valuable and fragile cargo, weak on the edges, and poorly balanced. New boxes were designed which eradicated most of the loss from these causes, and at the same time saved money in the box construction itself.

The lamp containers happened to be made of fiber, but usually a great deal more can be saved in the case of wooden boxes or crates. The weak features that stand out usually are too few nails, nails of too short a length, or nails driven in the wood in some manner so that shocks, drying, or strain pulls the wood from the nails, or causes it to split or break across the grain.

When delegates from the national associations of box manufacturers, wholesale grocers, and canners met in joint committee in Chicago, recently, the point of how many nails should be used to a box edge was brought up. Three nails to the edge had been the accepted practice, but some thought more would give better service. A forest-products expert was consulted.

He recommended at least six nails to the edge in a standard No. 3 can crate, and told the delegates that even seven or nine nails would give additional benefits. When this provoked laughter, he invited the delegates to accompany him to Madison. There he repeated the tests he had made previously on these boxes, and when the guests left they had decided upon seven nails to the edge as being more than three times as efficient as the old plan. They had been convinced that the scientific nailing of their boxes meant many thousands of dollars in their pockets annually.

After the extraordinary experience of the Ordnance Department with the box experts, Col. D. W. Dunne, chief inspector of the Bureau of Explosives, declared that it was his belief that at the present time all industry which is dependent upon containers made of wood, paper, or fiber for shipping, is losing from 25 per cent to 50 per cent of the cost of that shipping through lack of knowledge which now is possessed by forest-products experts. He stated that a saving of a full third could be made on all package shipping, whether domestic or export, simply by redesigning the containers to make them more economical of space and wood, and, at the same time, stronger for the protection of their contents.

Colonel Dunne advocates Federal laws establishing standard boxes of all descriptions and for all present purposes, these boxes to be designed by the Forest Products Laboratory, and put into use before the government returns the railways to private ownership. This would be a tremendous task, for every existing business today has its distinctive—and distinctively wasteful—shipping box or crate, and for each individual article the most economical container is different from that necessary for another.

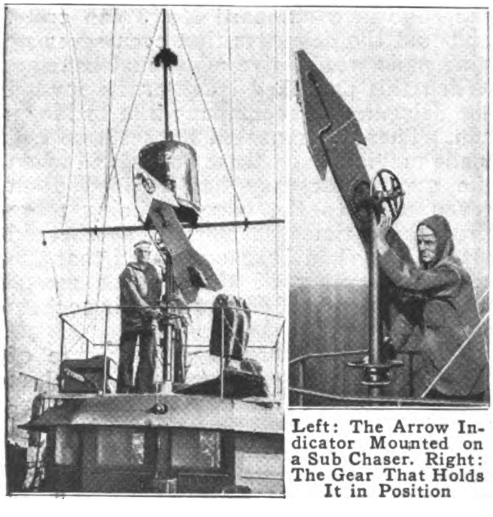
It probably could not be done before private ownership returns, but still it might as easily be accomplished through the agency of the Interstate Commerce Commission. The railroads could not put it over by themselves, for as soon as one group tried to dictate to shippers the whole of its business automatically would transfer itself to another line or group of lines. A saving of 35 per cent, however, is worth thinking over.

The project ought to come home to the shrewd Yankee business man also. The president of the American Railway Express Company recently put it in apt phrase: "It is an everyday fact that the American business man has learned to regard a satisfied customer as a direct asset to his business. He would do nothing that might jeopardize his relations with that customer. If the goods he sends that customer arrive in bad order, however, if the contents are damaged or pilfered because they are exposed during the journey, the customer does not wait for an explanation, but places his business elsewhere. Isn't it worth while for him to stop right now and make certain that his shipping crates are the very best procurable for his product?"

The Forest Products Laboratory stands ready to render this advice, in most cases free of charge, to any concern who asks. Where charge is made it is apportioned, and the laboratory bears part of the burden.

INDICATORS ON SUB CHASERS SPOTTED U-BOATS

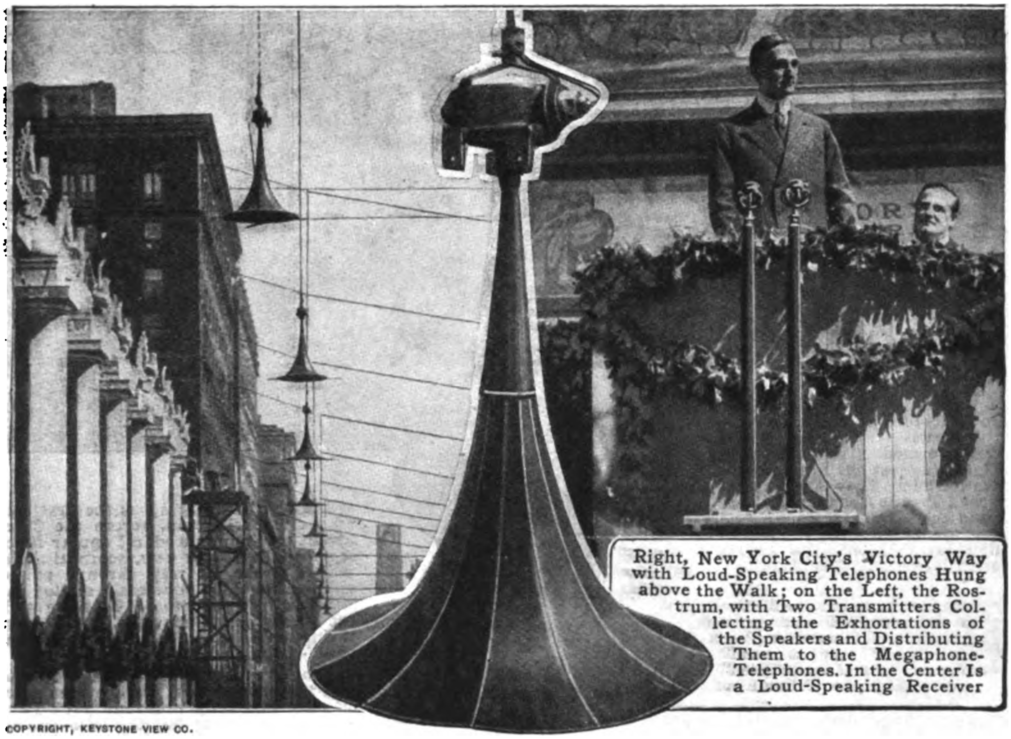
Adjustable arrows, six feet long, like the one in the illustration, proved of great value in several ways on American destroyers and sub chasers. By a prearranged interpretation of various settings the movements of the arrow could be used to govern convoy formations. Thus, turned to the right, it might mean "Close Up," or to the left "Increase the Interval." Another, and more obvious use, was in conjunction with the submarine-detector tubes which registered the position of a submerged U-boat. Thus, when one destroyer or sub chaser learned the foe's position, a simple manipulation of the arrow spread the knowledge to the whole convoy. It will be seen that the indicators may be illuminated for night signaling.



Left: The Arrow Indicator Mounted on a Sub Chaser. Right: The Gear That Holds It in Position

BALLOON OBSERVERS TO STAND GUARD OVER FORESTS

It is safe to predict that destructive forest fires will soon go out of fashion as a result of the many preventive measures being taken. Quite the latest is the forest balloon service. Experiments at an army balloon school have shown that the innovation is entirely practicable, and most efficient when in the hands of trained observers, who can spot a blue wisp of smoke miles away. The observer's telephone will be an essential part of the system that will spread the fire alarm through the great forests.



Right, New York City's Victory Way with Loud-Speaking Telephones Hung above the Walk; on the Left, the Rostrum, with Two Transmitters Collecting the Exhortations of the Speakers and Distributing Them to the Megaphone-Telephones. In the Center Is a Loud-Speaking Receiver

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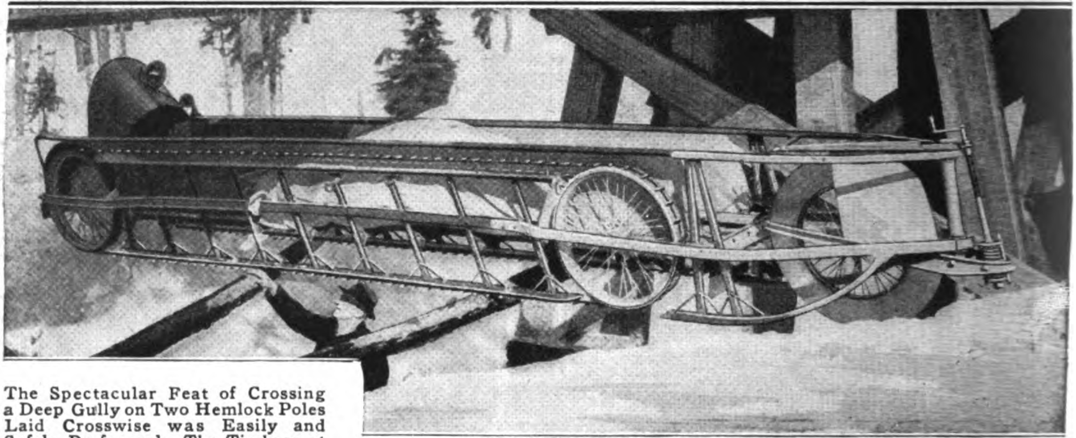
CROWDS HEAR VICTORY-LOAN SPEECHES FROM AIR THROUGH VOICE MAGNIFIERS

Gathered before the Treasury Building in Washington, during the Victory-loan campaign, a large crowd heard every word of a speech delivered by an airman flying 3,000 ft. above their heads. The invention that made this possible is a new sound-magnifying receiver, designed by two San Francisco men. The sensitive diaphragm of this instrument, which builds up and strengthens the infinitesimal vibrations of wireless-telephone transmission, has the usual receiver earpiece replaced by a huge resonating horn. The voice amplifier was connected to the terminals of the aero-radio apparatus, into whose transmitter, in the plane above, an army officer delivered President Wilson's Victory-loan appeal.

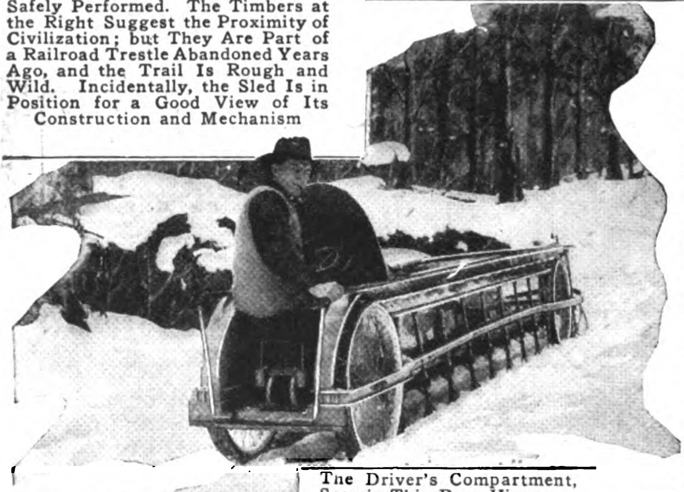
Meanwhile, amazed throngs along New York City's great Victory Way heard, literally descending upon them from above, the words of public speakers in stirring pleas for the loan. Suspended from wires strung far overhead were dozens of loud-speaking telephone receivers, their bell-shaped horns pointing vertically downward toward the walk. From their terminals the wires led to a pair of transmitters, mounted on pedestals before the speakers' rostrum. By this means the words addressed to those gathered about the platform were spread broadcast along the thoroughfare.

Looking into the Horn of the Radiotelephonic Voice Magnifier, from Which the Crowd before the Treasury Building Heard the Speech of an Airman Flying More Than a Half Mile Above Them

ACROSS THE CASCADE RANGE IN A MOTOR SLEIGH



The Spectacular Feat of Crossing a Deep Gully on Two Hemlock Poles Laid Crosswise was Easily and Safely Performed. The Timbers at the Right Suggest the Proximity of Civilization; but They Are Part of a Railroad Trestle Abandoned Years Ago, and the Trail Is Rough and Wild. Incidentally, the Sled Is in Position for a Good View of Its Construction and Mechanism



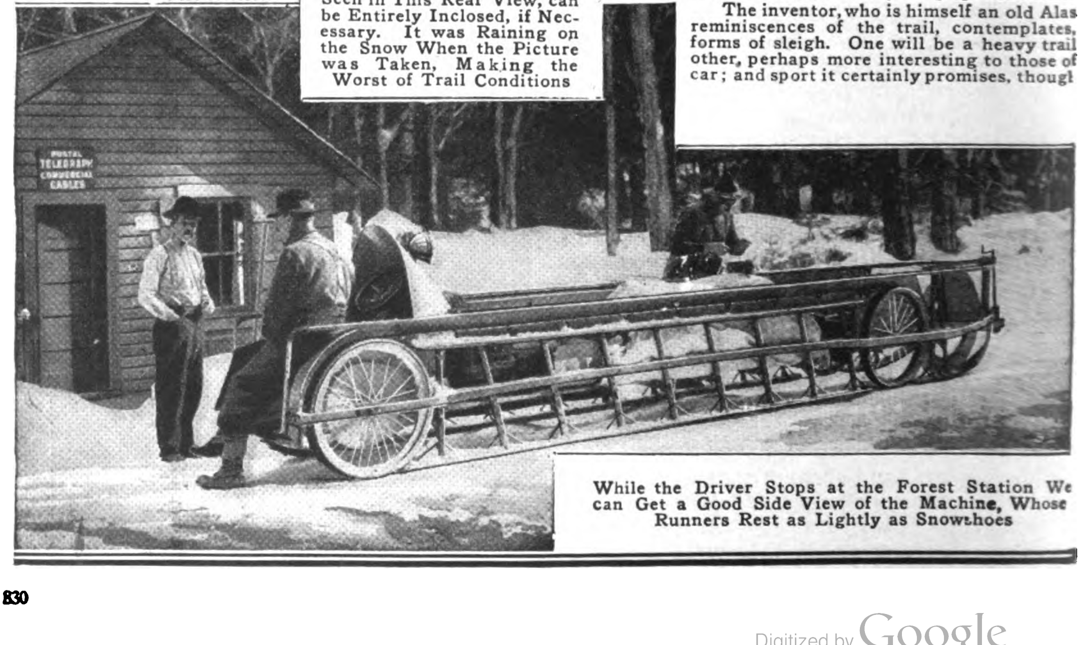
The Driver's Compartment, Seen in This Rear View, can be Entirely Inclosed, if Necessary. It was Raining on the Snow When the Picture was Taken, Making the Worst of Trail Conditions

ALMOST as amazing as the first perfor tacular trial trip, across the Cascade advent was announced in Popular Mechan of snowfalls old or new, scornful alike of vehicle broke its way through primeval of an automobile, hopelessly stalled in the incident in its progress. Crossing a deep one of the day's adventures. Small wonder miring witness of the whole performance quill"—whatever that may be.

The intended substitution of the motor ka's snowbound post trails means more to may be generally realized. Jack London a romantic figure; but the followers of the the elimination of much human hardship, ommends the gasoline method.

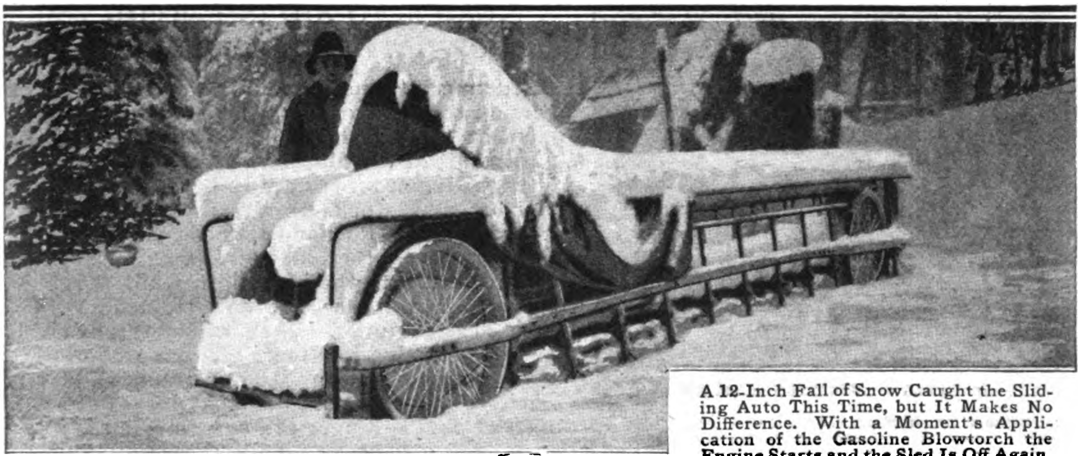
The motor sled itself, already described but 3 ft. wide and as many high. Its air- has a channel port in its jacket for the torch before starting on a 40° below- multiple-disk clutch are of regular type, severe duty. The drive, to the rear wheels, needed on a snow surface. The body has along under them, and consisting of three steel lugs are set on the cables at a surface- on its steel-channel frame, reproduces the sled. The speed is anything up to 25 miles

The inventor, who is himself an old Alas reminiscences of the trail, contemplates, forms of sleigh. One will be a heavy trail other, perhaps more interesting to those of car; and sport it certainly promises, thougl



While the Driver Stops at the Forest Station We can Get a Good Side View of the Machine, Whose Runners Rest as Lightly as Snowshoes

DISDAINFUL OF TRAILS, DRIFTS, OR WINDFALLS



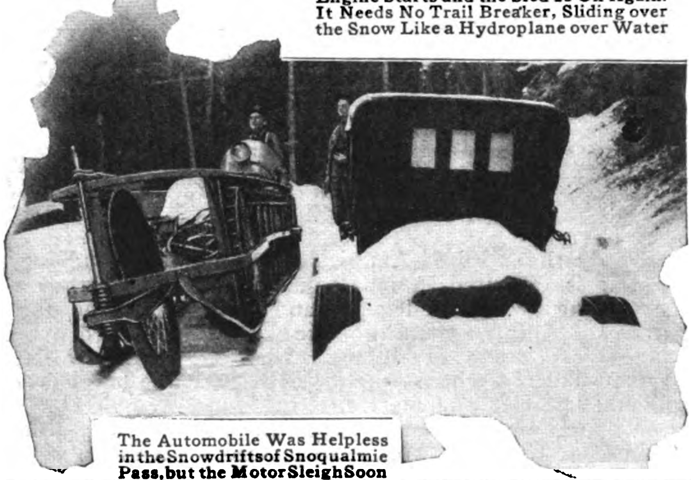
A 12-Inch Fall of Snow Caught the Sliding Auto This Time, but It Makes No Difference. With a Moment's Application of the Gasoline Blowtorch the **Engine Starts and the Sled Is Off Again.** It Needs No Trail Breaker, Sliding over the Snow Like a Hydroplane over Water

mances of the army tank was the spec- Mountains, of the motor sleigh whose ics last month. Skimming the surface trails or obstacles, the strange little passes with never a stumble. The rescue drifts of Snoqualmie Pass, was a mere gully on a pair of hemlock poles was but that the forest ranger who was an ad- exclaimed that the gas sled was "the real

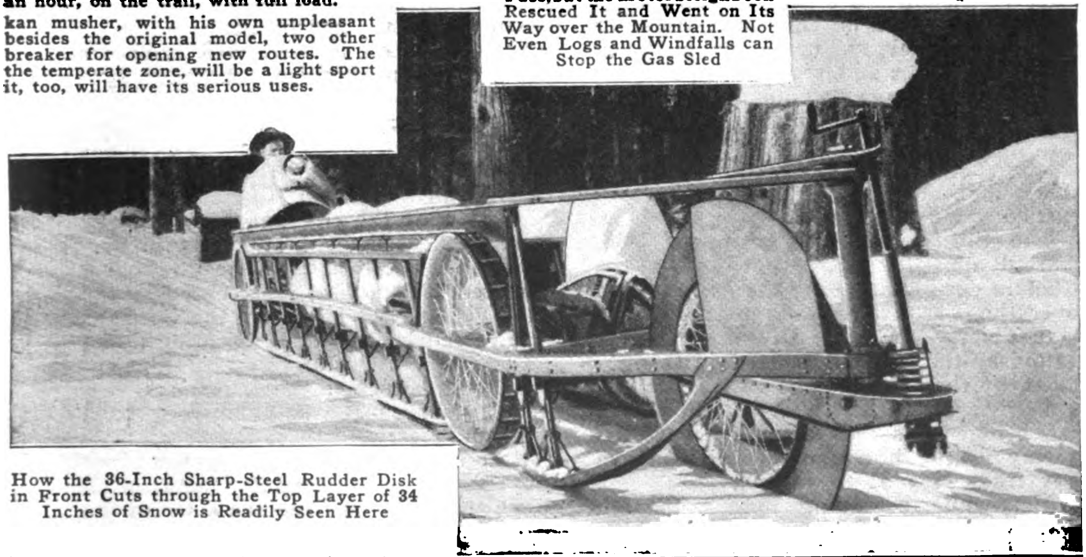
sleigh for the dog-drawn sledges of Alas- the people of that great territory than and others have limned the malemute as trail know well he is never that. It is as well as canine inefficiency, that rec-

as 25 ft. long and 900 lb. in weight, is cooled, 22-hp. motor, aluminum-housed, momentary application of a gasoline zero Alaskan morning. Gear shift and but all parts are large and heavy for is by worm gear; but no differential is runners like any sled, the tread passing endless steel cables on each side. Hard- gripping angle. The rigid hickory body, rawhide-braced basket of the typical dog an hour, on the trail, with full load.

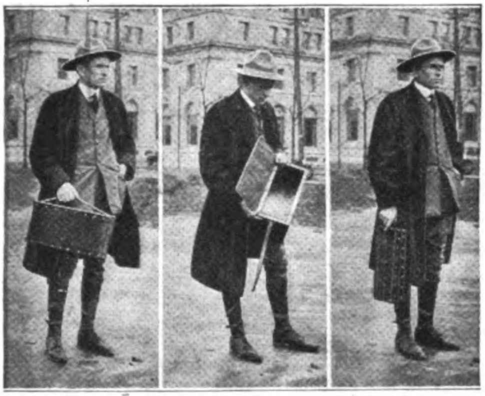
kan musher, with his own unpleasant besides the original model, two other breaker for opening new routes. The the temperate zone, will be a light sport it, too, will have its serious uses.



The Automobile Was Helpless in the Snowdrifts of Snoqualmie **Pass, but the Motor Sleigh Soon** Rescued It and Went on Its Way over the Mountain. Not Even Logs and Windfalls can Stop the Gas Sled



How the 36-Inch Sharp-Steel Rudder Disk in Front Cuts through the Top Layer of 34 Inches of Snow is Readily Seen Here



The Picture at the Left Shows the Pigeon Case as Carried along the Forest Trails. In the Center It has been Opened; at the Right It is Collapsed

PIGEONS TO AID IN PATROL OF NATIONAL FORESTS

Homing pigeons, carried by forest rangers on their patrols, will this season supplement the telephone lines which ordinarily spread the alarm of fire. Rangers in two Oregon forests are to be equipped, and breeding stock has already been obtained from a Portland association. As the eggs hatch, the older birds will be set free to return to the home loft, while the youngsters will be kept and trained in their special duties. They will naturally be of most value in remote sections where wire communication is uncertain and liable to failure, or perhaps does not exist at all. A ranger can carry five birds in a light, collapsible traveling case.

TANGLED WAR STORIES CONFUSE PUBLIC

By PAUL JENKINS

PRESS and platform hailed the marines as the saviors of Chateau-Thierry, not understanding—as it eventuated—that these intrepid fighters were not located in the town itself but rather in the Chateau-Thierry neighborhood. The fact that there were two American engagements in this region helped increase the confusion of ideas. Even our own account of the splendid marksmanship of the marines published on page 259 of the February issue contained some inaccuracies of date and location, which we believe the following summary of American operations in Chateau-Thierry proper will serve to correct.—Editor.

Already the story of America's part in the war is obscured in many details by a confusing growth of legends and inaccuracies. And nowhere do the myths hang thicker than about the name of Chateau-Thierry, where America's citizen-soldiers first met and mastered the Hun in an operation of major importance. In the case of Chateau-Thierry, this regrettable confusion has arisen, primarily, because the name is often loosely used for the whole vicinity, including a dozen near-by hamlets, and, secondarily, because two distinct engagements were fought here during the summer of 1918.

A review of the local operations of May, June, and July, 1918, will clarify the story, and bring a more equal share of justice to all concerned.

The third German offensive of 1918, started on May 27, swept across the Chemin des Dames, over the Aisne River, over the Vesle River, and reached Chateau-Thierry on May 31. Here it was halted by the French, assisted, in the city itself, by the 7th Machine Gun Battalion, 3rd Div., U. S. A. This battalion held the bridgeheads and struggled with the enemy in the northern outskirts of the city from May 31 to June 4.

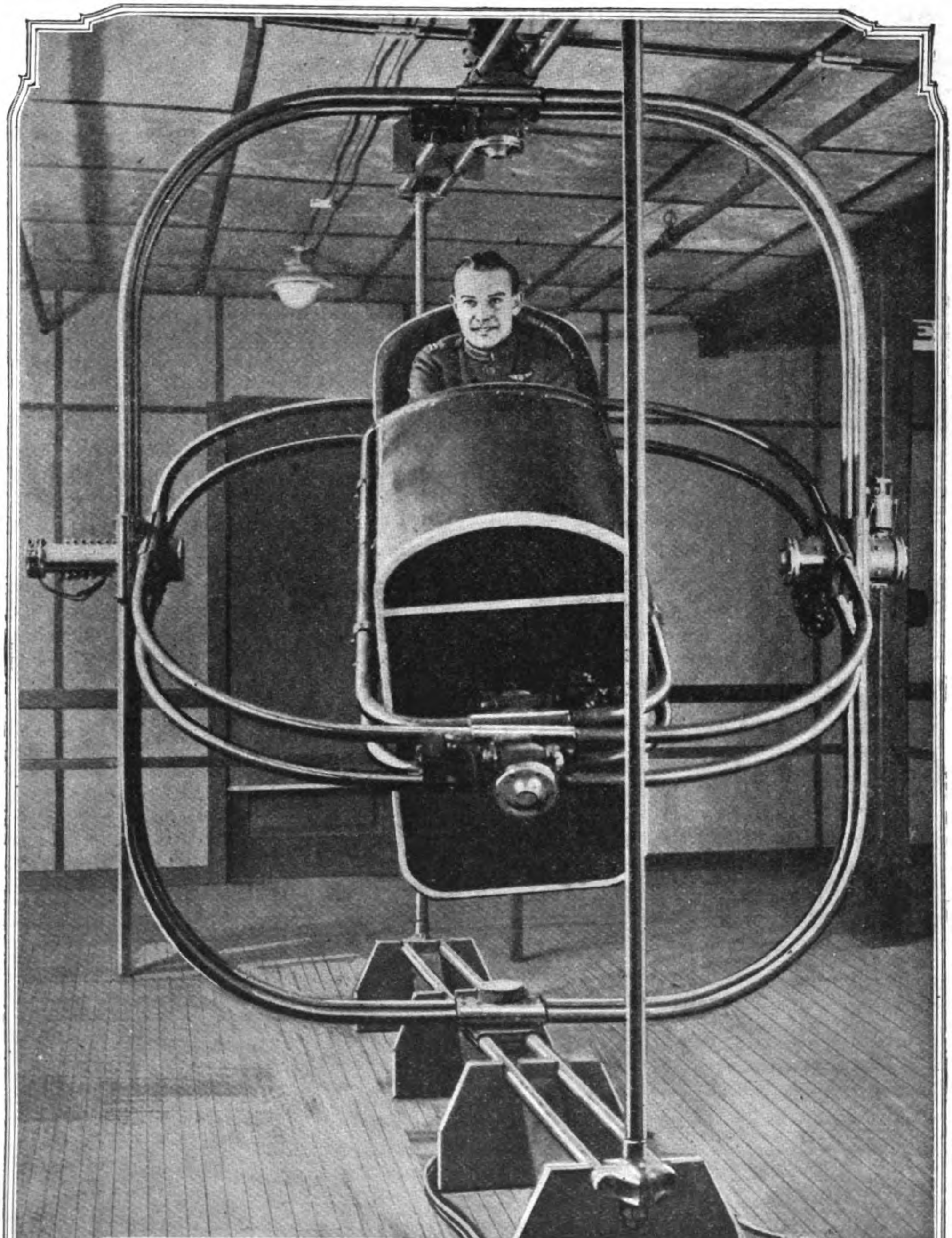
Meanwhile, beginning June 2, the 5th and 6th Regiments, with the 6th Machine Gun Battalion, U. S. Marines, were winning undying fame, four or five miles to the northwest of the city. Checking the Germans for four days, they counter-attacked on June 6, 1918, and during the next few days pushed straight through the tangled underbrush of bloody Belleau Wood.

Thus, although they did no fighting in the city itself, the Marines helped save Chateau-Thierry by removing menacing pressure from the northwest.

And finally, on July 15, 1918, came the fifth great Hun offensive, ushered in by a bombardment of the 60-mile front from Chateau-Thierry eastward to Massiges. Unsuccessful at most points, the Germans did succeed in crossing the Marne along the 12 miles east of Chateau-Thierry. And this time the city was garrisoned by the French alone, only the eastern outskirts and the five miles beyond being entrusted to America, represented by the 3rd Division. But here, too, the Germans were forced back after a wavering fight; and on the morning of July 18, 1918, General Foch launched the victorious surprise attack on the 25-mile front from Chateau-Thierry north to Soissons.

Although these simple paragraphs cannot encompass the whole truth, it is hoped that they may remove some of the misconceptions that must inevitably prove harmful to American tradition.

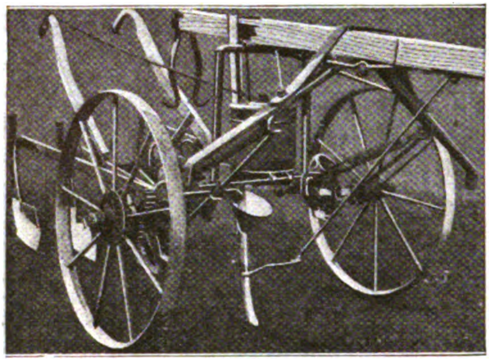
ACCUSTOMS NEW FLIERS TO AERIAL SENSATIONS



ALL the maneuvers and consequent sensations of expert flight are experienced within the walls of a room by the pilot of a new training machine for novice airmen. The nacelle of the counterfeit plane is hung in gimbals like a ship's compass, giving it free movement in every possible direction. As the student manipulates the correctly arranged controls, the machine carries him into loops, nose dives, tail spins, and every other evolution practiced in the navigation of space. The device, designed and built by a New York man, is now doing service in training young army officers at the Washington flying school. It strikingly illustrates the development in this class of machine since the appearance of the simple arrangement which formed the cover subject of Popular Mechanics only last September.

AUTOMATIC PLANTING DEVICE ATTACHES TO CULTIVATOR

Now the small farm is having its inning with labor-saving machinery. A Missouri farmer has invented a planting attachment for cultivators, in which the seed box is automatically operated by a gear on one of the wheels, dropping its seed into a planting nozzle in front of the cultivator blades. The planter is thrown into or out of action by a rod extending to the handles of the machine.



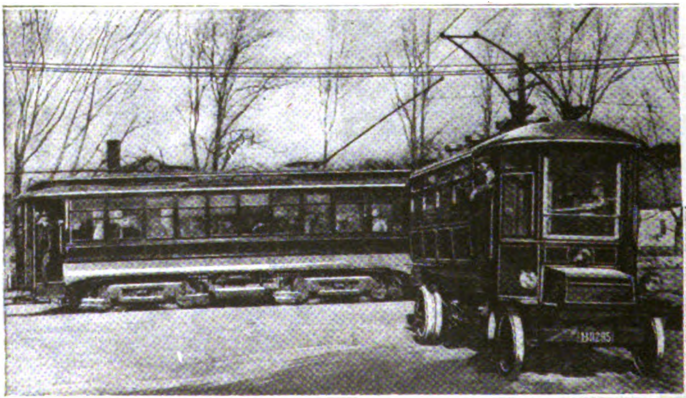
The Seed Box is Seen Fastened in the Center of the Cultivator; It is Operated by the Gears on the Wheel at the Left, Dropping Seeds into the Planting Spout Below

NAVY BUILDS MORE RADIO-COMPASS STATIONS

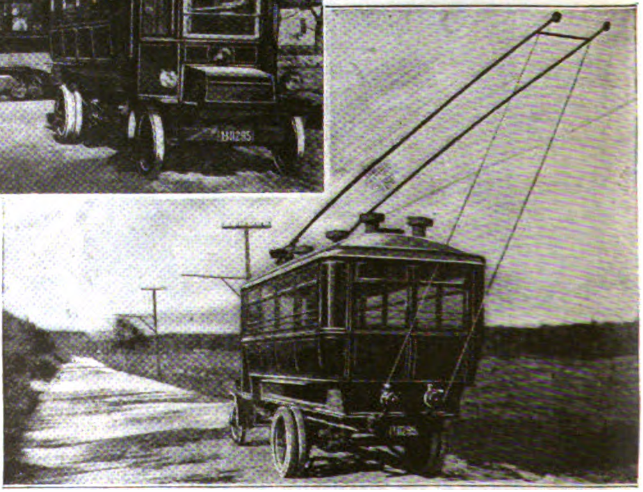
The radio compass, described in Popular Mechanics for January, 1912, has proved such a success on vessels of the United States Navy that 19 stations are soon to be established on the Pacific coast, in addition to the 33 now on the Atlantic and Gulf coasts. The new western stations will cover the entrances to Puget Sound, the Columbia River, Los Angeles, San Francisco, and San Diego.

TROLLEY CAR DRIVES TO CURB FOR PASSENGERS

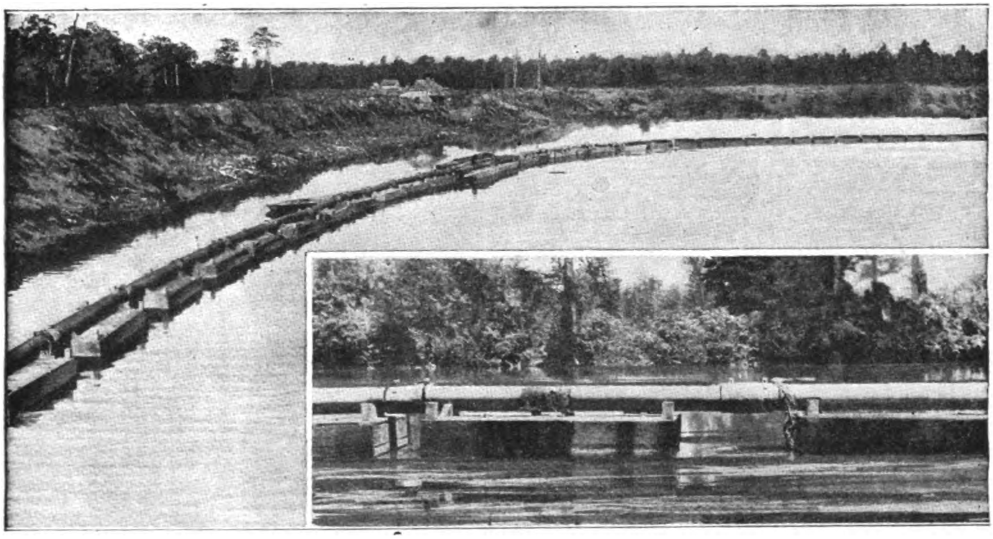
Several small New England towns have recently followed the lead of many foreign cities in adopting the trackless trolley. The American model resembles a long auto bus, travels on wide, solid-rubber tires, and is heated, lighted, and propelled by electricity supplied through two trolleys to an ordinary street-car motor. In cost of installation and operation, the trackless trolley is said to be much cheaper than its predecessor, as expensive rails, switches, and signals are all unnecessary. It is claimed to be more satisfactory in performance, also, as the swinging trolleys permit divergence to any part of a 25-ft. roadway, thus allowing the car to pass slower vehicles, avoid ruts, and even drive to the sidewalk to take on and discharge passengers.



As the Picture Suggests, the Trackless Trolley Car is Designed Primarily to Supplement the Service Provided by the Street Car



The Two Trolleys Are So Long That the Trackless Trolley Car can Travel on Either Side of an Ordinary Road, and Is Thus Able to Avoid Ruts and Pass Slower Vehicles



Some Idea may be Gained, from the Large View, of the Length of Floating Discharge Pipe Used in a Mississippi Dredging Operation, and the Number of Wood Pontoons Constructed for the Work. The Insert View Shows How the Pipe Sections were Connected by Rubber Sleeves

LONG DREDGE-DISCHARGE PIPE FLOATED ON WOOD PONTOONS

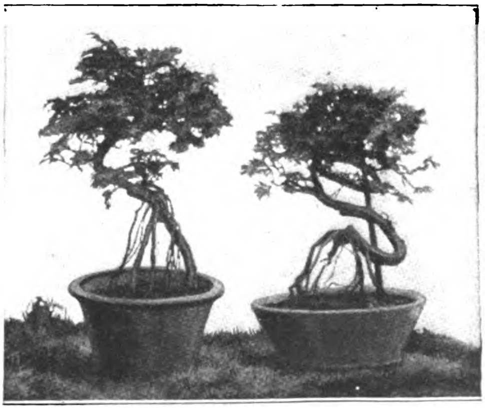
Overcoming extraordinary obstacles is the civil engineer's daily routine. In a Mississippi drainage job, a channel filled with stumps and logs, imbedded in stiff clay, was successfully cleared with a hydraulic dredge, aided by some blasting and crushing. The channel being too narrow for the usual steel pontoons, the long discharge pipe from the dredge was floated on quickly constructed pontoons of 2-in. pine, 13 ft. long, 7 ft. wide, and 2 ft. deep, carrying 16-ft. lengths of pipe. Rubber sleeves 2 to 3 ft. long connected the sections. This floating line to the spoil bank stretched out 300 or even 400 ft. as the dredger moved forward.

WORKMEN MAROONED HIGH IN AIR BY SALT STORM

A violent windstorm recently swept across Great Salt Lake, and overland into Ogden, which it coated with a thin layer of salt. Buildings, pedestrians, sidewalks, and automobiles were all "salted" impartially. The only real damage done, however, was in the destruction of a 200-ft, scaffold around a concrete grain elevator. Six unfortunate workmen, who were on top of a finished part of the elevator, 100 ft. in the air, at the time of the collapse, were completely marooned until rescued with extension ladders by the local fire department.

JAPANESE DWARF TREES GROWN BY SURVIVAL OF UNFITTEST

Japanese love for the miniature extends even to the deliberate mutation of nature's processes. Dwarf trees, for example, are patiently cultivated by inverting Darwin's law, selecting the weakest and most stunted specimens and pruning away the vigorous and fast-growing members. By cramping and trimming the roots and starving the seedling over a period of perhaps five years, the proud owner achieves a mature tree only a few feet tall, a pigmy replica of some forest monarch. Some of these dwarfs have been known to live for 200 years.



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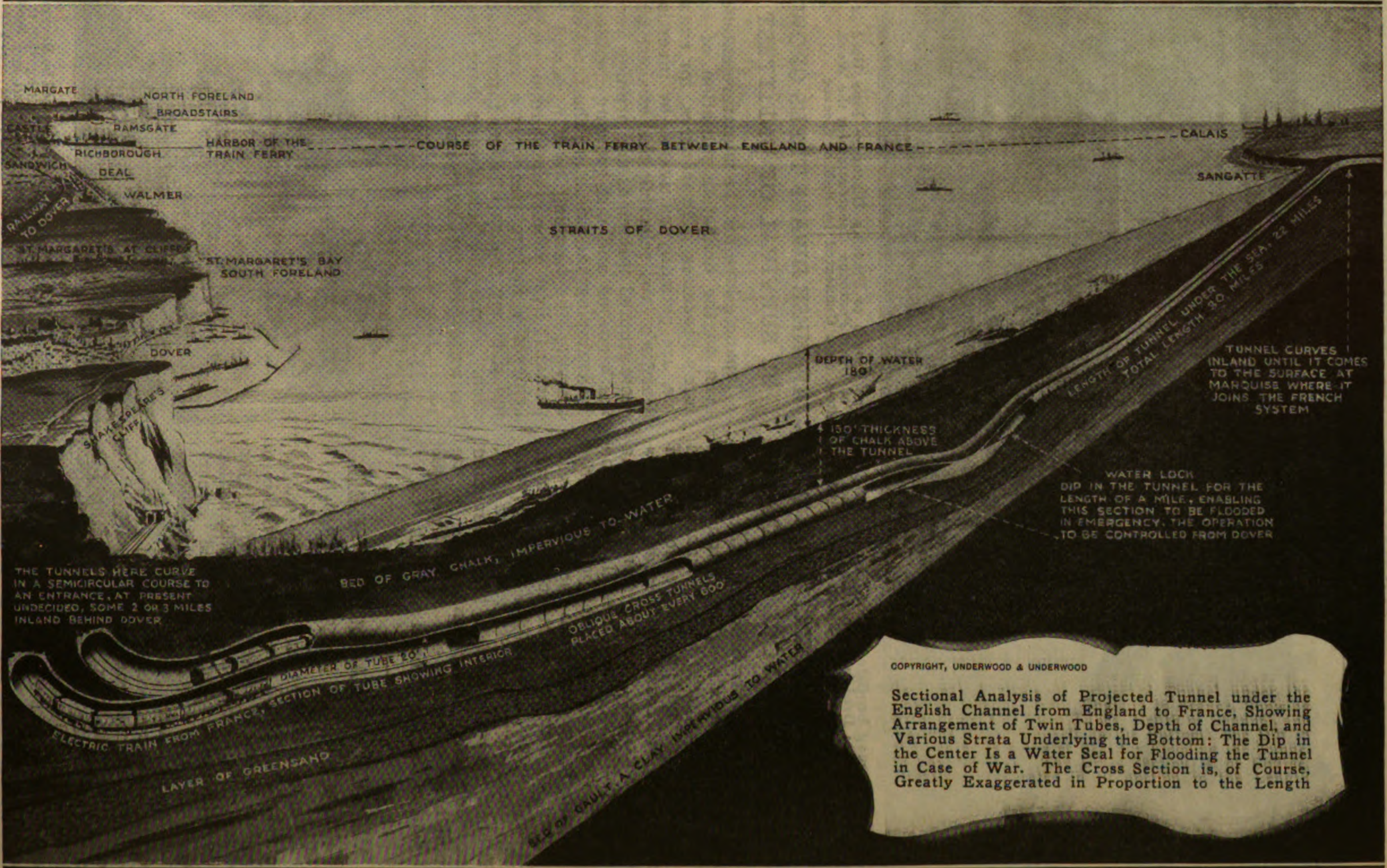
Japanese Dwarf Trees, Patiently Cultivated by Reversing the Usual Process of Selection, Cutting Off the Vigorous Shoots, and Nursing the Small and Puny Ones: This Procedure is Continued for Several Years


MARGATE
NORTH FORELAND
BROADSTAIRS
CASTLE
RAMSGATE
RICHBOROUGH
SANDWICH
DEAL
WALMER
HARBOR OF THE TRAIN FERRY
COURSE OF THE TRAIN FERRY BETWEEN ENGLAND AND FRANCE
CALAIS
SANGATTE
RAILWAY TO DOVER
ST. MARGARET'S AT CLIFFE
ST. MARGARET'S BAY SOUTH FORELAND
STRAITS OF DOVER
DOVER
SHAKESPEARE'S CLIFF
DEPTH OF WATER 180'
150' THICKNESS OF CHALK ABOVE THE TUNNEL
LENGTH OF TUNNEL UNDER THE SEA, 22 MILES
TOTAL LENGTH 30 MILES
TUNNEL CURVES INLAND UNTIL IT COMES TO THE SURFACE AT MARQUISE WHERE IT JOINS THE FRENCH SYSTEM
WATER LOCK
DIP IN THE TUNNEL FOR THE LENGTH OF A MILE, ENABLING THIS SECTION TO BE FLOODED IN EMERGENCY. THE OPERATION TO BE CONTROLLED FROM DOVER
BED OF GRAY CHALK, IMPERVIOUS TO WATER
THE TUNNELS HERE CURVE IN A SEMICIRCULAR COURSE TO AN ENTRANCE, AT PRESENT UNDECIDED, SOME 2 OR 3 MILES INLAND BEHIND DOVER
OBLIQUE CROSS TUNNELS PLACED ABOUT EVERY 600'
DIAMETER OF TUBE 20'
SECTION OF TUBE SHOWING INTERIOR
ELECTRIC TRAIN FROM FRANCE
LAYER OF GREENSAND
BED OF GAULT, A CLAY, IMPERVIOUS TO WATER

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Sectional Analysis of Projected Tunnel under the English Channel from England to France, Showing Arrangement of Twin Tubes, Depth of Channel, and Various Strata Underlying the Bottom: The Dip in the Center Is a Water Seal for Flooding the Tunnel in Case of War. The Cross Section is, of Course, Greatly Exaggerated in Proportion to the Length

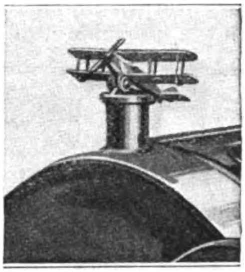
TUNNEL FOR ENGLISH CHANNEL REAL PROSPECT AT LAST

Plans for a tunnel under the English Channel, discussed so frequently during the last sixty-odd years, are now on the verge of materialization. It is announced that England and France are in perfect accord on the subject, and that war experiences have robbed its opponents of most of their contentions. From an engineering standpoint no serious difficulty is anticipated; through the impervious gray chalk underlying the channel bottom, electric drills will doubtess find easy and rapid passage. The plan calls for two 20-ft. tubes, side by side, connected at short intervals by cross openings. A drainage tunnel underneath disposes of seepage water. At the center of its length the tunnel dips to its lowest grade for one mile, constituting a water lock which could be flooded from the shore in case of military necessity. The total length from near Dover to a point between Calais and Boulogne, will be 30 miles, of which 22 will be 95 to 175 ft. below sea bottom. The channel's greatest depth over the proposed course is 180 ft. Estimates allow five years for completion, at a cost of $100,000,000. Electric trains will make the passage in 40 or 45 minutes, giving England direct access by rail to all parts of Europe.

AMERICAN BUYER BRINGS HOME PLATINUM WORTH MILLIONS

Packed in a specially constructed safe, a quantity of platinum totaling 23,000 oz., and worth $2,415,000 at the market price of $105 an ounce, was recently brought into this country. It traveled from Russia as the personal baggage of a Massachusetts business man, who had undertaken on his own responsibility to secure it for the government. To this task he gave over a year of his time without remuneration, advanced his own funds, overcame an uncounted number of dangers, obstacles and hardships, and sacrificed his health. The precious metal was obtained in many places, a few ounces at a time, the buyer carrying the accumulation with him. A tragic ending to the story of commercial romance is supplied by his death, four hours after his return, from exhaustion.

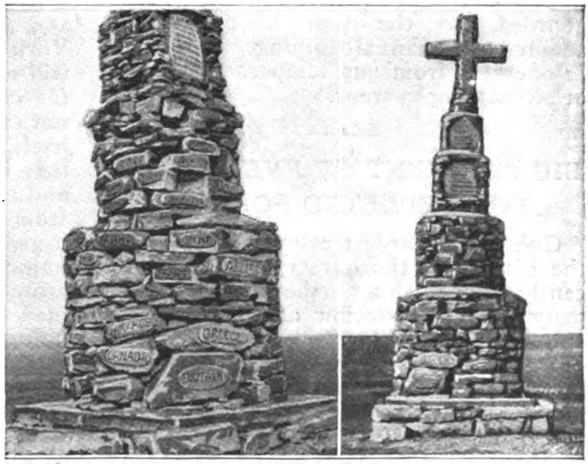
SMALL DE HAVILAND PLANE ADORNS RADIATOR CAP



Aluminum models of the De Haviland battle plane, with a wing spread of nine and one-fourth inches, are now made for desk use as a paper weight, or for attachment to radiator caps. The American insigne, in colors, on the wings and the propeller, which revolves on a moving automobile, give it quite a businesslike appearance. The little model is correct in all its essential proportions.

TEXAS HILLTOP CROWNED BY VICTORY COLUMN

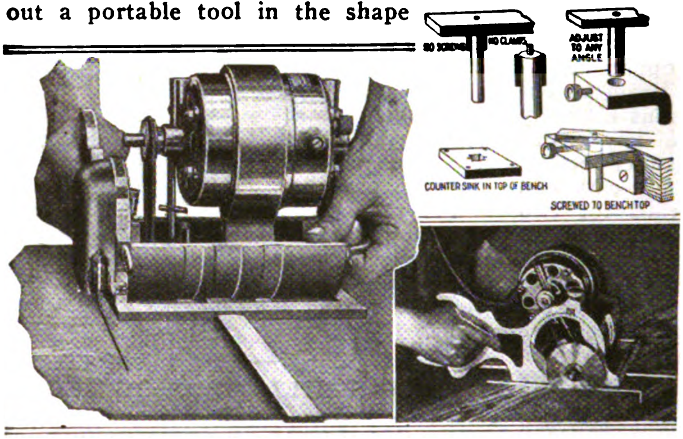
Crowning a Texas hilltop stands a rude monument that speaks to travelers, for miles throughout the valley, of the people's gratitude for victory and their affection for the local men who sailed overseas. The ranchmen built the pedestal of rough stones, bound them together with cement, and surmounted the whole with a white cross. On every smooth-faced stone they inscribed the name of some allied statesman, general, flier, or victory, while on a tablet just beneath the cross they had engraved the names of the heroes from the valley. The unique monument rises 21 ft. above the hilltop.



Texas Ranchmen had Engraved on These Stones the Names of Heroes and Battles That Brought Victory to the Allies

WOODWORKING MADE EASY WITH ELECTRIC HANDSAW

Until lately a handsaw was one thing and a circular saw was another. But now an enterprising manufacturer has brought out a portable tool in the shape of a hand circular saw, with electric drive, that should make sawing wood a pleasure. A ¼-hp. universal motor is mounted directly on the tool, which has a handle like a regular handsaw and weighs only 12 lb. Two 3-in. saws are supplied, a rip and a crosscut, an eccentric mounting allowing adjustment for depth. The base, of aluminum, is grooved to slide on a track when a guide is necessary, such a track being part of the equipment. For ripping, the gauge slides along with the work. The saw blade is well guarded, so the tool is particularly adapted to manual-training school use. It operates from any lamp socket, direct or alternating current.



Light, Portable Circular Saw Operated Like a Handsaw: At Right, Guard is Removed to Show Eccentric Adjustment. Above are Shown Methods of Fastening Track to Workbench, So That Grooved Base of Saw may Guide It Accurately in Any Direction

BIG SHIPMENT OF EVERGREENS FOR DEPLETED FORESTS

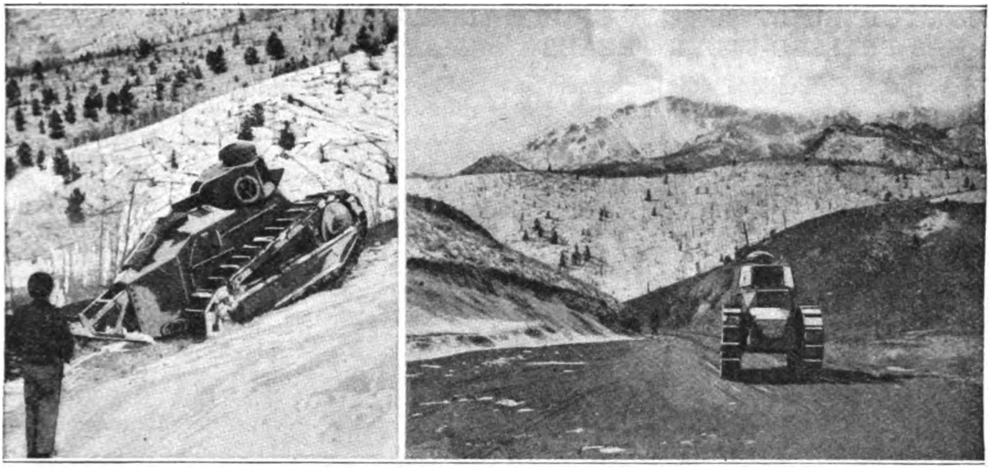
One of the largest evergreen orders in the history of the nursery trade was recently shipped to a northern lumber company for reforestation of the concern's cut-over lands. The shipment consisted of 1,500,000 Norway spruce trees, enough to line a 280-mile road, as from Chicago to St. Louis, if planted only one foot apart. The nursery company kept a gang of more than 50 men at work on this order for two weeks, digging, counting, and packing.

ATLANTIC FLEET RACES NORTH IN SUCCESSFUL SPEED TEST

The Atlantic fleet recently concluded a most instructive season of battle and target practice at Guantanamo by racing up the Atlantic coast in record time. Every minute of the trip was used for maneuvers, and, north of Cape Hatteras, the weather proved so ideal that a most exacting speed trial was ordered. Starting at 17 knots, the armada was soon churning the foam at 19, then at 20.5, and finally at every ship's maximum speed. As a result, each one of the great vessels exceeded its record made in government acceptance tests, and the fleet steamed into New York harbor, behind the new superdreadnaught "Mississippi," just 20 hours ahead of schedule. New York was surprised, but Riverside Drive was soon crowded with those anxious to see the most imposing marine spectacle ever staged in American waters, consisting of 12 "all big gun" fighters, more than 60 destroyers, 10 new submarines, and a whole division of auxiliaries.

RUBBER "MUSCLES" ENABLE WOOD DOLL TO WALK

By using the resiliency of rubber bands as a substitute for muscular action, a New York inventor makes a wooden doll that will actually walk. Of course it will not stroll away by itself, but when led by the arm and swayed gently from side to side, it gives a very fair imitation of a promenade. Handled with an acquired knack, it readily bows and even executes a few terpsichorean steps. The large size of the figure adds to the illusion of life, and at a short distance it appears to be stepping along very well for one so young.



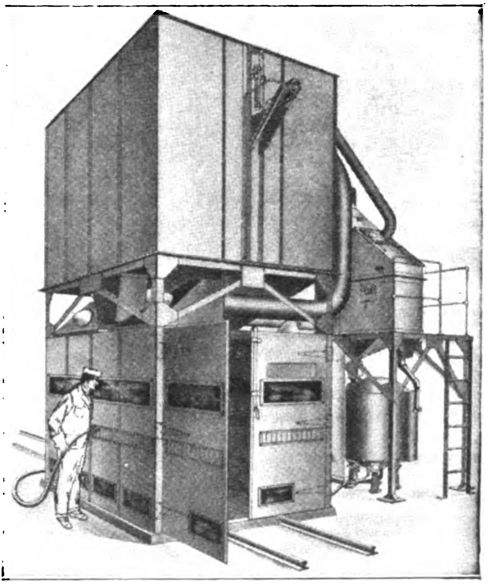
This Tank Set Out for the Summit of Pikes Peak to Advertise the Victory Loan. At the Left It is Seen Skirting One of the Drifts That Blocked the Ascent. It would Probably have Reached the Top but for an Unexpected Change in the Schedule

WAR TANK TRIES TRIP UP PIKES PEAK

The "Little Zeb" is one of the several tanks that toured the western states in the interest of the Victory loan; but it is the only one that tried to climb Pikes Peak. It courageously chose an unfavorable time of year, too, when the winding mountain road was blocked by snowdrifts that sometimes rose in its path to a height of 10 feet. It waddled along finely behind its motto "Pikes Peak or Bust," however, until twelve miles up the slope something did "bust." Repairs were made, despite a 60-mile gale, near-zero weather, and a cracker-and-sardine diet for the crew. Then the "Little Zeb" started again, only to be stopped, still short of the summit, and ordered elsewhere by a messenger from headquarters.

STEEL ROOM SECURES SAFETY FOR SAND-BLAST OPERATOR

For cleaning large castings with a sand blast the use of a steel room has been found to result in increased safety and convenience for the operator. He wheels the casting into the room on the house tracks, closes the steel doors, and directs the sand blast upon the casting through a multiple-section curtain which permits movement of the nozzle in all directions. He is able to watch his work, meanwhile, through a wire-protected curtain at the height of his eyes. Spent abrasive, core sand, and refuse fall through the grated floor, and are carried by a conveyor to a separator which delivers waste material to a refuse bin, and the abrasive sand, sharp and clean, to a storage bin for reuse. Through the inlet screens along the bottom and a ceiling hood at the top a powerful draft is maintained, keeping the room free from dust.

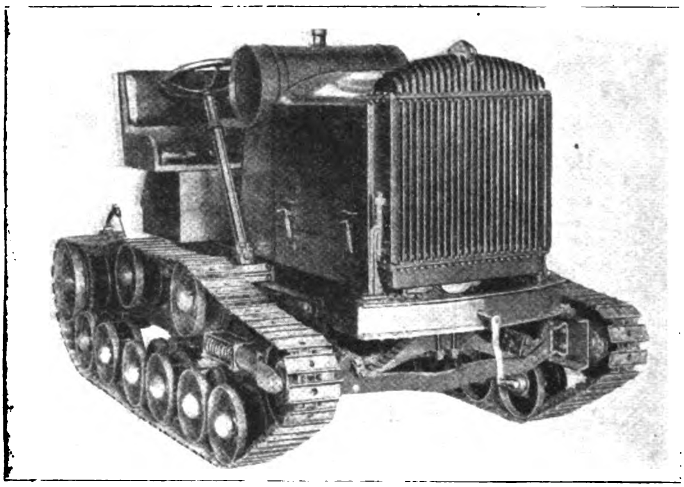


The Sand-Blast Operator is Entirely Protected from Choking Dust and Flying Particles by This Steel Room

¶War-time restrictions on the use of radio receiving stations, other than those used for commercial traffic, have been removed. The restrictions on transmitting stations remain in effect.

TRACTOR BUILT LIKE A TRUCK HAS PRESSED-STEEL TREADS

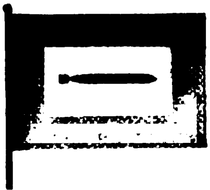
Except for its more compact form, a type of farm tractor recently designed follows the conventional lines of motor-truck construction. Experimental work performed by the inventor while in the Ordnance Department of the army is declared to have suggested the departures from usual tractor practice. The endless tread is made entirely of pressed steel, assuring strength and lightness.



Motor-Truck Construction Is the Characteristic of This Three-Plow Farm Tractor, the Only Important Difference being the Running Gear, Which Is the Endless-Tread Type, Made of Pressed Steel

NEW WARNING FLAG FOR SHIPS ACCOMPANYING SUBMARINES

A conventionalized torpedo in black, on a white field with a wide red border, is the design of the navy's new warning flag. It warns, however, of the presence of our own subs and not an enemy's. All tenders, launches, and other craft accompanying underwater boats in their practice operations, fly it to keep commercial shipping out of danger.



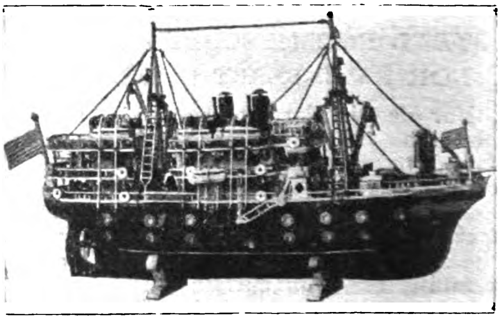
¶ Gas masks of the type approved by the government are reported to have failed when two members of a large city fire department penetrated a cold-storage room filled with fumes from a broken ammonia pipe.

IRELAND-AMERICA RADIO TALK MAY EVOLVE WORLD SYSTEM

Early establishment of commercial radiotelephone stations for transatlantic messages is promised as a result of successful transmission from Ireland to Cape Breton Island, Nova Scotia, a little more than 2,000 miles. While this breaks no distance records, the reliability of wireless-telephone equipment has been greatly improved since the 4,800-mile conveyance of speech from Arlington, Va., to Pearl Harbor, Hawaii, in September, 1915. A recently developed form of vacuum-tube valve was used in the Ireland-Nova Scotia test, but further details of the equipment are not disclosed. Photographs purporting to show the new receiving apparatus have appeared in the popular press, but prove to be views of apparatus used in 1915. No new photographs have yet been released.

PRESIDENT GIVEN FRUIT OF TWO YEARS' TOIL

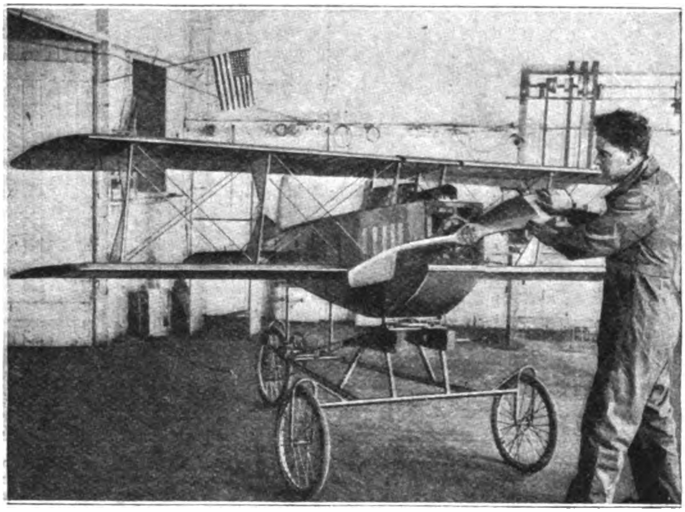
When a Greek miner completed a miniature ocean liner after two years' labor, he promptly christened it "The Agent of Democracy" and sent it to President Wilson. With knowledge gained from service in the Greek navy, he was able to include every important detail found on large vessels.



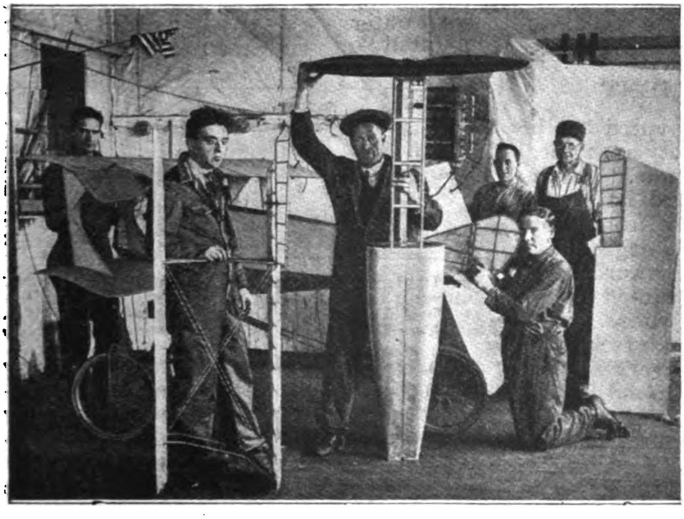
This Model Steamship Is Only 28 Inches Long, Yet It Possesses Every Important Detail of an Ocean-Going Vessel

PILOTLESS TORPEDO PLANE IS FLYING DESTROYER

A pilotless airplane, charged with 50 lb. of the dread T. N. T., and adjustable with uncanny accuracy to explode at any point within 400 miles, is one of the spectacular weapons whose use by the American army was forestalled by the armistice. The device, which is literally a complete small biplane, was invented by a Los Angeles man, and had already received the attention of government experts. The machine flies without its ground wheels and chassis, which are disengaged, as the body rises, by the action of a governor releasing a spring. About a 300-ft. run is needed after starting the engine, before the plane attains a speed of 40 miles an hour and soars away. In its flight it reaches an altitude of about 3,000 ft. The rear half of the body is a bomb, which may be set to explode at any desired distance. How the machine is guided so accurately to its calculated destination is not divulged. But at the determined point, a trigger is released; instantly the power of the engine throws the wings clear off the machine. The body, engine and all, drops, nose first, like a plummet, the engine and its parts adding to the occasion by serving as shrapnel when the burst occurs. The tail guides the downward flight, but explosion follows on landing in any position. A flight of 100 miles resulted in accuracy of burst within 50 yd. in government tests. Acting practically as an ultra-long-range gun without a barrel, the cost of a shot with the flying projectile is declared to be comparatively low.



The Self-Propelled Bomb-Plane as Seen Here Is Ready for a Start. The Chain Gearing Observed at the Rear of the Chassis Operates a Governor, Which Disconnects the Plane's Body from the Running Gear When the Speed Is Sufficient for Flight. The Details of Adjustment Which Assure Such Extraordinary Accuracy in the Explosive "Landing," Caused by Detaching the Wings from the Body at a Predetermined Distance, are Not Disclosed



This Is the Bomb into Which the Plane is Changed When It Throws Off Its Wings, and the Loaded Body and Engine Drop to the Ground

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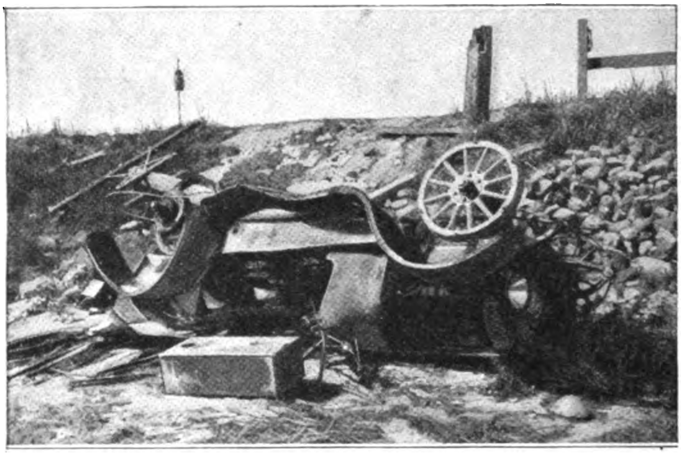
¶ The attorney-general of the United States has been requested by the secretary of war to begin condemnation proceedings for government acquisition of Cape Cod Canal. The private owners of this convenient water connection with Boston and other New England points refused an offer of $8,250,000 made by the war department.

FAILURE TO DIM HEADLIGHTS CAUSES BAD AUTO WRECK



Glaring Headlights on Another Car Were Directly Responsible for This Accident, the Blinded Driver Turning Out Too Far and Striking a Fence Post. A Telephone Pole Broken by the Crash is Seen Lying on the Bank

All who have driven along dark roads at night know the sense of apprehension kindled by the glaring headlights of an opposing car. Recently an army officer, driving a brand-new car along a California road, blinded by approaching lights, turned too far out and crashed into a 4 by 4-in. fence post. The car turned completely around, cutting off a 12-in. telephone pole, rolled, upside down, into a deep ditch, and then burned up. The driver and his fellow officer were seriously, but by good fortune not fatally, injured. To dim headlights in meeting other cars is required by law in many states.

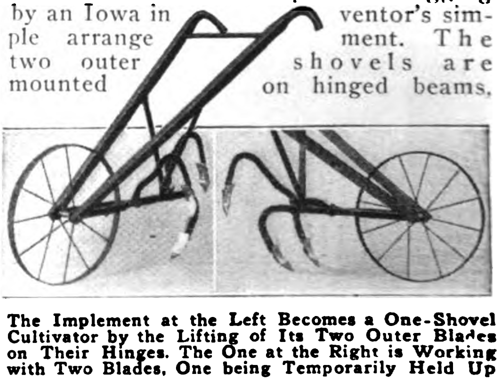
YALE UNIVERSITY DROPS LATIN REQUIREMENT

Recent changes of policy voted by the corporation of Yale University are typical of the new educational attitude. The reorganized college will demand Latin as a graduation requirement only from those students who wish the B. A. degree. To those with no Latin will be awarded the degree of Ph. B., hitherto granted by the Sheffield Scientific School, whose graduates will now be Bachelors of Science. The college will require of every student in every course, however, a sound knowledge of American history and government. Further, it will grant its professors a substantial increase in salary, insuring a higher grade of instruction to the students and a more comfortable living to teachers and families.

ARMY SURGEON DESCRIBES LESSONS TAUGHT BY WAR

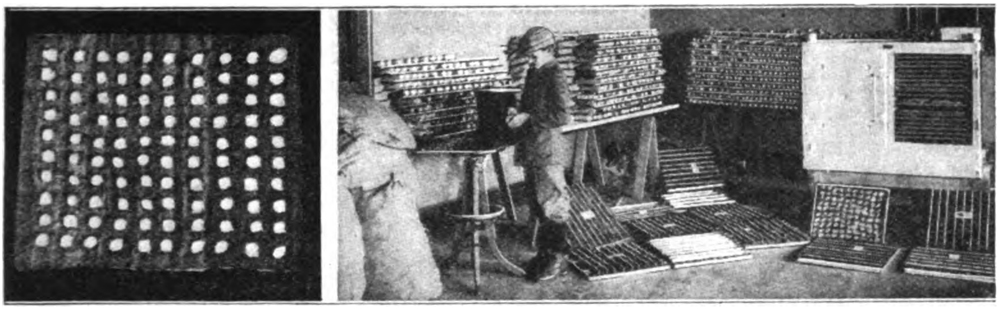
Among the lessons learned from wartime surgical experience an American Army authority chooses two as of outstanding importance. The first is the change from the harsh antiseptic methods of the war's first years to mild aseptic treatment. Surgeons have found that well-nourished tissue withstands infection, and even expels it, without external aid. In consequence, they simply clean the wound of foreign matter and devitalized tissue, and close it immediately without the use of an antiseptic. The second lesson learned is that shock is caused by deficient oxidation of the red corpuscles. Hence, to avoid this shock, so often fatal in major operations, nitrous oxide combined with oxygen has been widely used as an anesthetic.

ANTICLOGGING GARDEN PLOW HAS TWO HINGED SHOVELS



The Implement at the Left Becomes a One-Shovel Cultivator by the Lifting of Its Two Outer Blades on Their Hinges. The One at the Right is Working with Two Blades, One being Temporarily Held Up

Cultivators or garden plows of the three-shovel kind are kept from clogging by an Iowa inventor's simple arrangement. The two outer shovels are mounted on hinged beams, so that either one or both may be swung up out of action. They are held in normal position by large washers and wing nuts on the center beam, which is stationary. Each washer is cut away on one side, and when turned permits the beam to swing past it. Turned back, it holds the beam suspended.



In the Seed-Corn Tray at the Left, the Kernels are Laid in Compartments in Damp Sawdust. At the Right is Seen a Corner of a Seed-Testing Station, the Electric Testing Cabinet Being at the Extreme Right. The Boy is Cording the Ears to Save Racks

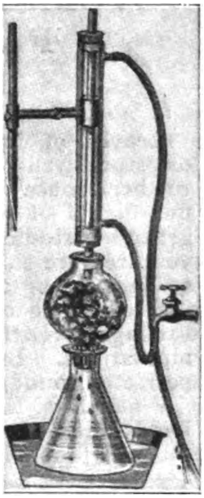
DAKOTA FARMERS SAVE CORN WITH ELECTRIC TESTER

Farmers in one county of South Dakota raised a fine crop of corn from very poor seed, and saved about $15,000, just because the director of the county farm bureau installed an electric seed tester. This device consists of a water-jacketed metal cabinet, with a heating element in the bottom and a thermostat in the top. Its two compartments each contain 18 wire-screen trays, holding the samples of seed, either folded in canton flannel, or, for single-ear tests, inclosed in holes punched in a blanket pad. Trays of moistened sawdust are also used. With its constant standard of heat, moisture, and air supply, the tester assures a reliable indication of germination.

CARPENTERS' FOLDING SQUARE HAS MANY USES

By hinging the ordinary carpenters' steel square, and providing a third strip, calibrated in inches and degrees, to connect the two arms, a folding square has been obtained that may be put to many uses. It may be clamped to lay off anything from a straight to a right angle; it will divide any angle as desired, or it may even be extended, clamped, and used as a yardstick. Besides making several instruments superfluous, the tool will fold into the carpenter's tool box, unlike the cumbersome rigid square.

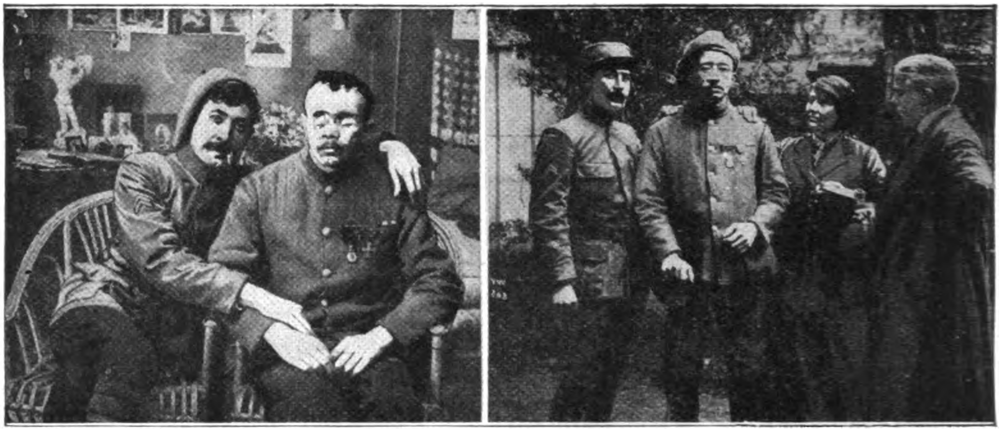
SURGEON USES SAME IODINE MANY TIMES



Iodine is now recovered from the hundreds of gauze and cotton "mops" used daily in the surgical wards of a large army hospital. Instead of throwing them away, as formerly, they are heated in the apparatus illustrated. Alcohol evaporates and condenses in the cooled upper tube, then falls back through the mops, carrying the iodine down with it to the bottom of the flask in the form of a tincture. The mops are saved, too, by subsequent washing and sterilizing.

HANDLE BRAZED TO FRAME PLEASES MOTORCYCLISTS

A body of motorcycle policemen decided that the repeated effort of lifting their 350-lb. motorcycles on and off the stand many times a day was too fatiguing. So the mechanic in charge devised a handle which he brazed to the frames in the most convenient position, greatly reducing the effort needed each time the heavy machine is lifted.



PHOTOS BY COURTESY OF THE Y. W. C. A.

This Blind French Soldier is Waiting, as We See Him at the Left, for the New Mask and Artificial Eyes Which Restore to Him the Normal Appearance of the Right-Hand Picture

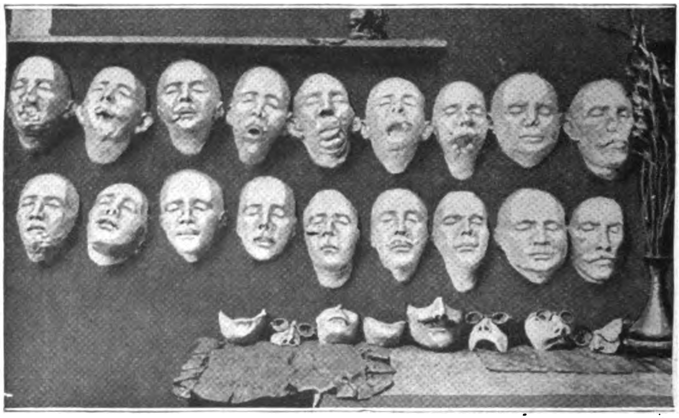
WOMAN MODELS HAND-PAINTED COPPER FACES FOR MUTILATED SOLDIERS

BY GRACE GOULDER

With the Y. W. C. A. in France

Leaves of ivy dance over the high, old stone walls of the courtyard in front of her house and you have to climb five flights of winding wooden stairs to get to her studio. And when you get there, you are sure to find a half dozen French soldiers sitting around chatting or drinking tea. One or two of them will have bandages over their faces, or horrible face mutilations. But the others will seem perfectly sound and whole.

When Mrs. Ladd—Mrs. Anna Coleman Ladd she is—comes forward to greet you, she will probably be carrying what looks for all the world like a human nose, or part of a man's cheek, or maybe it will be an ear. And she handles it quite unconcernedly as she goes on talking with you. For in the time she has been in Paris she has made parts of faces for 71 mutilated soldiers.

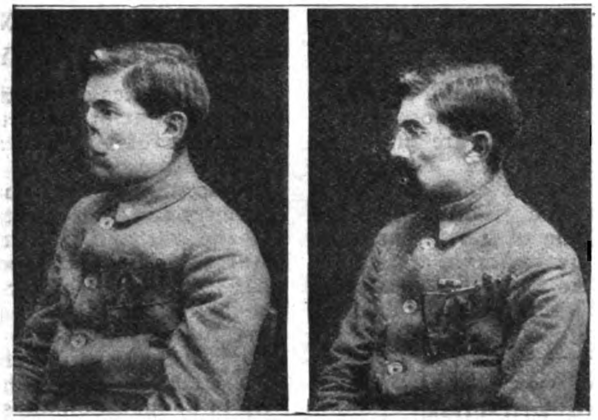


This View of a Corner of Mrs. Ladd's Studio Shows Some of the Many Models She Uses in Her Humane Undertaking. The Masks, of Thin Copper, She Makes from Casts of the Mutilated Features

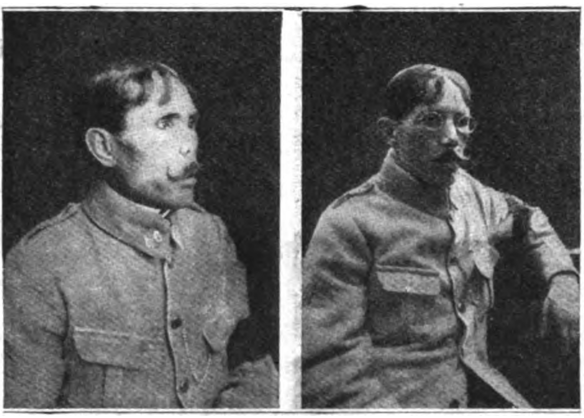
She tells you to look at the man in the corner—the one passing cakes to his companions. You observe a rather handsome black-haired boy, with a decoration pinned on his blue soldier's blouse. And Mrs. Ladd tells you that his nose and mustache, as well as part of his cheek, are artificial. He will take the mask off if you want him to, she announces, but you beg to be excused from witnessing it.

"Oh, they are just as proud as they can be of their new faces. All these men would show you their masks in a minute and be glad to," she will tell you. "This one standing near the modeling board has no chin at all. He was wounded early in the war and he was very much discouraged about life. But now he is going to be married and the future looks bright. Of course, he has to lift his mask every little while to wipe away the saliva, and he cannot talk well or eat solid food or smoke—but he feels that he can mix with people once more.

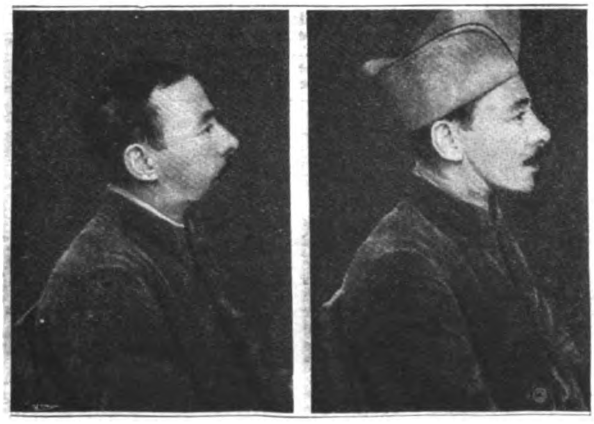
"So far, I have had only five American boys. I cannot make masks until the wound is entirely well and that takes some



Here We See, First, an Example of War Mutilation, All Too Common a Sight in France These Days; and Second, Its Restoration by False Nose, Made of Thin Copper and Tinted Carefully by Hand, and a Mustache



Another Instance Where an Artificial Nose, Provided for a Mutilated French Soldier, Brought Back Not Only Appearance, but Confidence and Morale to Its Wearer, Thereby Making Him a Better Citizen and Certainly a Happier Man



This Soldier had His Chin Shot Away with an Effect on His Appearance Which May be Realized by a Glance at the Left Picture; but with a Copper Substitute, and a New Mustache, the Injury Is Not Perceptible

time. Also, I never get the cases until the surgeons are sure they can do nothing for them. And so, the Americans have not started to come to me in any great numbers.

"But every one of those who come has been so sensitive and dispirited. The French are different about it. They have become used to horrible wounds in the four years of this war—used to their own and those of their friends. But these American soldiers saw nothing ahead. They wouldn't believe my masks would make them as good as new. You don't know what a satisfaction it is to fit them out and see their pleasure and surprise. They seemed to take hold all over again as they looked at their changed faces."

Mrs. Ladd was a sculptor in Boston before she took up this work for the Red Cross. She first models the maimed face. Then she makes a cast of the face as it was before the wound. Most frequently she does this from a photograph. When the soldier has none, she studies what is left of his face and models the missing features to suit the rest. The mask itself is made of thin copper. This is afterward tinted with the most delicate of water coloring, a process requiring the most exact and careful work because the mask must match perfectly the skin of the face. These artificial face parts are usually held in place by means of a string matching the color of the hair and worn over the back of the head.

Some of the men have had frightful eye mutilations. Mrs. Ladd has fashioned new eyes for them. Her mustaches and whiskers are guaranteed to last. They can be pulled and twirled, a fact appreciated by the Frenchman. Indeed, there is no part of the human face Mrs. Ladd has not supplied.

Hanging in gruesome rows along the walls of her studio are dozens of plaster casts of mutilated faces and of corresponding normal faces. Some of them are twisted and smashed into almost unrecognizable masses. Mouths are pulled in hideous fashion under ears. Noses and chins are swept off faces entirely.

A touching versified tribute was paid the sculptress by one of her French patients, who ends by saying that he and his fellow sufferers "through years to come shall never forget her kind ministrations."

SEAPLANE SHIPS DIFFER IN CONSTRUCTION

The invaluable patrol and convoy work accomplished by allied flying boats during the war was often furthered by the use of mother ships which extended the cruising radius of the planes to every corner of the seven seas. In the illustration two different types are shown. The British ship "Navanna" picks up her charges at the stern, from which they are carried into the hangar, where they are completely protected from sun and rain. On the Italian "Europa," however, the planes are slung along the sides.

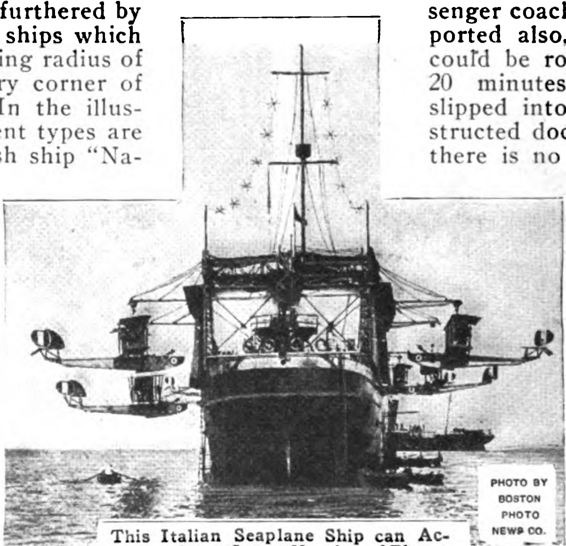
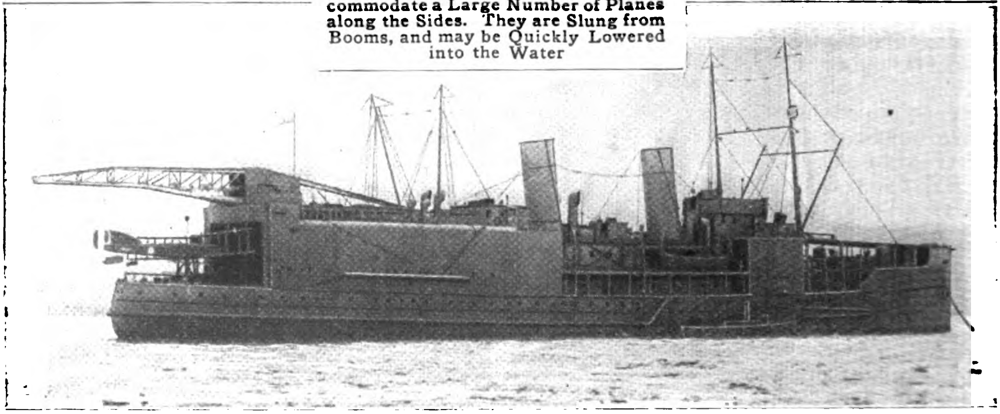


PHOTO BY BOSTON PHOTO NEWS CO.

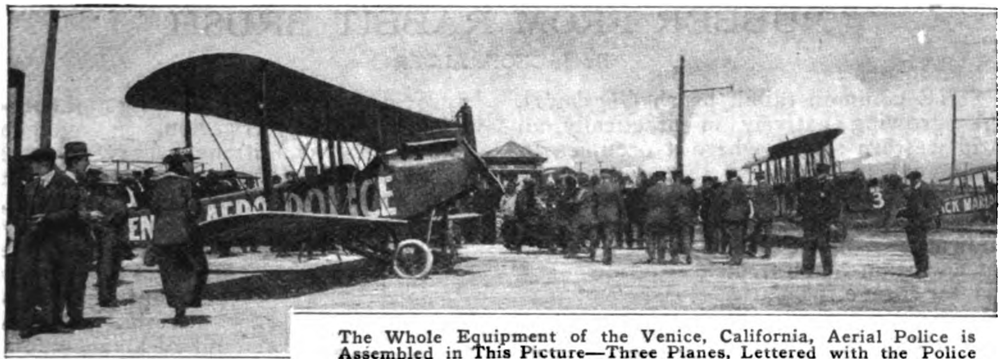
This Italian Seaplane Ship can Accommodate a Large Number of Planes along the Sides. They are Slung from Booms, and may be Quickly Lowered into the Water



This British Ship Is of Different Design. Only a Few Planes can be Sheltered in the Hangar at the Stern, but They are Completely Protected from the Weather, and can be Transported in the Roughest Seas. Vessels of This Sort Were Invaluable in Extending the Cruising Radius of Sub-Hunting Flying Boats

PROPOSED CHANNEL FERRY WOULD CARRY 300 CARS

For centuries suggestions have been offered for facilitating the cross-channel commerce of England and France. The tunnel from Dover to the French coast has fascinated most imaginations; but a car ferry has been in actual operation during the war, and its extended use in peace is urged by many advocates, who declare that it needs no better demonstration of its value than has been given. One of the best informed of these has made definite proposals, suggesting the construction of two 25,000-ton ferries that could make the trip in about 90 minutes. He would have the boats 600 ft. long, with a draft of 29½ ft., and arranged so that 300 freight cars might be carried on the two decks. Passenger coaches would be transported also, which he figures could be rolling on their way 20 minutes after the ferry slipped into its specially constructed dock. Unfortunately, there is no French port near Dover with harbor deep enough for boats of such heavy draft, but it is explained that Boulogne harbor could be dredged, or a new port could be constructed at a cost of approximately $15,000,000, and requiring about four years' work.



The Whole Equipment of the Venice, California, Aerial Police is Assembled in This Picture—Three Planes, Lettered with the Police Designations, and a Station House. The Small but Speedy "Black Maria" is Seen at the Extreme Right

VENICE AERIAL POLICE STATION NO. 1
VENICE AERIAL POLICE STATION NO. 1
VENICE
POLICE

Venice Aerial Police Station No. 1 Is the Close-Up at the Left. The Right-Hand View Shows the Mayor of Venice Swearing in the First Aerial Policeman, Who Is Proprietor of a School for Fliers, and His 80-Horsepower Patrol Plane

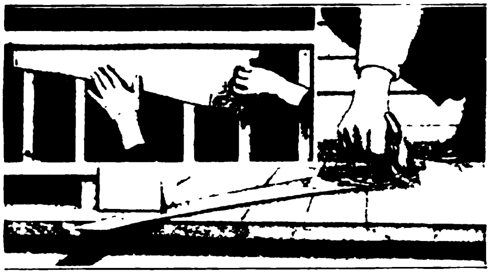
FIRST AERIAL POLICE FORCE APPOINTED IN CALIFORNIA

Traveling its ethereal beat over the city of Venice, Calif., is the world's first airplane police force. Venice Aerial Police Station No. 1 is open, and three patrol planes are ready for terrestrial law breakers. A speedy biplane, the "Black Maria," and two 80-hp., 90-mile an hour, passenger-carrying planes constitute present equipment, which will be increased when occasion demands. On the body and under the wings of each plane are the police designations in yellow letters. Speed violations and surf accidents are the special assignments of the fliers.

¶Across 11 miles of rough country near Pittsburgh, Pa., is being constructed what is probably the largest gas line in the world. It will have a maximum diameter of 40 in., enabling it to convey 70,000,000 cu. ft. of gas daily from a by-product coke plant to three steel mills.

HINGE IN SAW HANDLE SAVES KNUCKLES

Operating a handsaw, with the blade flush against a wall or other flat surface, has meant scraped knuckles as long as saws have been used. One carpenter has finally decided to conserve knuckles and temper, however, by hinging the handle. An adjusting screw holds it in any position relative to the blade.



The Common Annoyance Caused by Attempts to Saw as in the Illustration is Removed by the Adjustable Hinged Handle

RUBBER FROM RABBIT BRUSH

By J. CECIL ALTER

THE common rabbit brush *(Bigelovia)*, growing natively in practically all arid western states, where it occupies an area next in extent to that covered by sagebrush and shadscale, has hitherto been considered valueless except as an indicator of moist subsoils, and a source of a certain amount of winter forage for cattle. However, recent experiments by H. M. Hall, professor of botany, University of California, and his special assistant for Utah, Prof. Marcus E. Jones, have discovered it to be a certain container and producer, and a probable commercial source, of fine rubber, only slightly inferior to pure Para rubber.

Thousands of Acres in Western States are Covered with This Rabbit Brush, Hitherto Considered Practically Valueless, But Now Declared a Probable Commercial Source of Fine Rubber

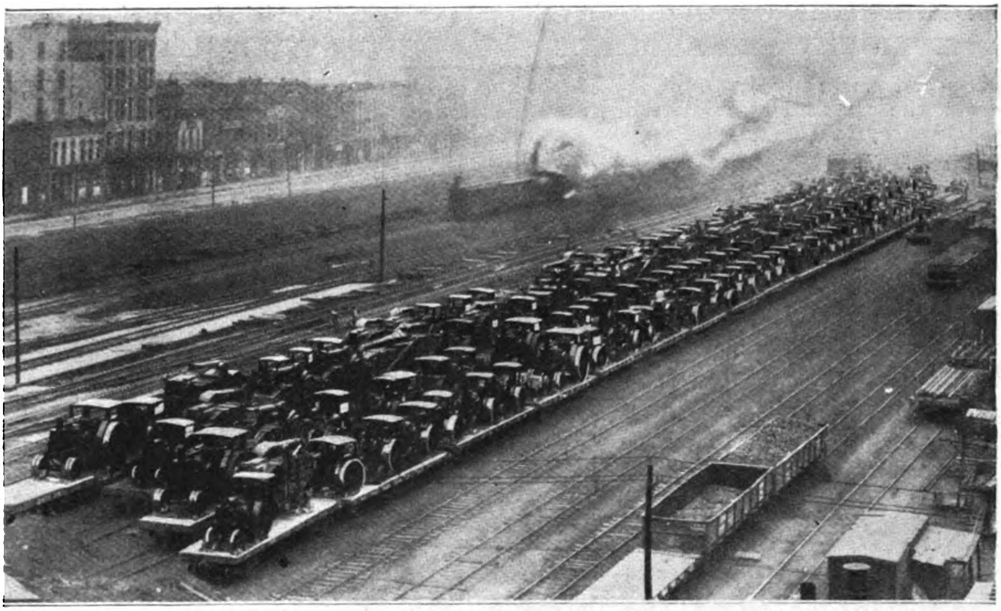
The investigation so far reported is only a preliminary quantitative examination, begun quietly some months ago as a war measure, but continued to prevent vitiating valuable information partly developed. It has not yet been announced to be commercially profitable, though in Utah alone there is said to be between 500 and 1,000 square miles of the brush, and a great deal more land that could be made to grow the plant. Tests reported by Professor Hall show from 5 per cent to 10 per cent rubber, by weight, of the entire plant, excluding the finer roots and stems, though Professor Jones believes, from his own determinations of rubber content, that 10 per cent is extremely high, probably two or three per cent being nearer the average yield from a well-developed plant.

Natively there are from 1,000 to 4,000 plants per acre, weighing from .1 to 2 lb. each, though it is estimated by the investigators that about 3,000 plants, averaging 3 ft. high and weighing around 3 lb. each, can be grown on an acre, which, at a fair calculation based on tests made, would yield around 250 or 300 lb. of rubber. Plants have been found 10 ft. high and 4 in. in diameter at the bole. If grown artificially by planting and cultivation, without irrigation, in average Utah weather conditions, a harvest could be taken every four or five years, at a light expense for seeding and harvesting. Under irrigation the yield could probably be increased fourfold, it is estimated. The quantity of rubber in the plant seems to vary directly with the amount of alkali in the soil, up to a certain limit; thus the less value the soil is for agricultural purposes, the more valuable for producing rubber. The greatest quantity of rubber is found in the plant in winter, hence this would become the harvest season. The rubber is dissolved out through the pores in the wood, or, after macerating, with the ordinary benzine solvents of rubber.

CLINKERS BROKEN WITH WATER JET

A stream of water is used successfully to remove the clinkers which are caught between the grate and bridge wall, in the boiler equipment of an electric company in a central state. Burning local grades of soft coal, handled with an underfeed stoker, occasional clinkers are formed too large to pass the opening to the ash hopper. When this happens a fireman directs a stream of water upon the clinker through the side door. Only a minute is required to cut or break up the fused mass, which parts readily before the jet. The rapid evaporation of the water prevents damage to any part of the furnace.

¶The opulent ex-doughboy, who has now donned civilian clothes and is living on the income from his army pay, may be interested in diminutive gold and silver service chevrons now being displayed by the jewelers for wear on the coat lapel.

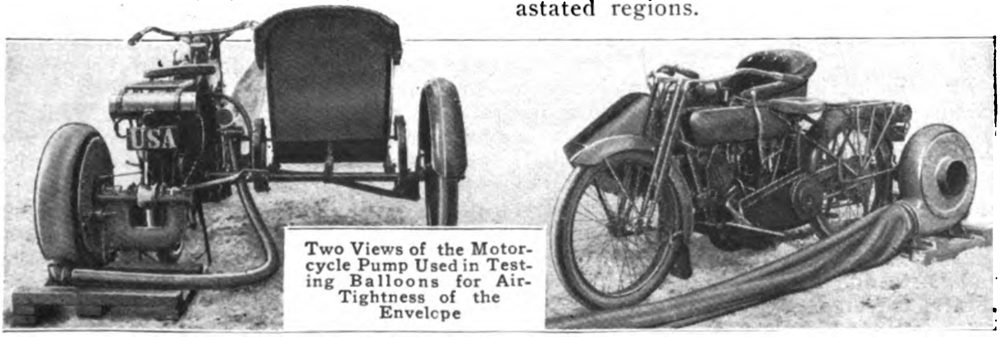


HUGE TRACTOR AND SEPARATOR SHIPMENT BREAKS RECORDS

DURING a middle-western tractor show one company exhibited in the city freight yards a $250,000 shipment of tractors and small grain separators. The shipment was made from a single factory to dealers in three western states on two trains of 40 cars each, and is believed to establish a new record in size. It certainly illustrates the increasing popularity of motor equipment for the farm.

MOTORCYCLE USED IN TESTS OF ARMY BALLOONS

For trial inflation of army balloons several schools are finding small, portable motorcycle outfits a great convenience. The rotary air pump is transported in the sidecar, and, in operation, is simply placed behind the motorcycle with its small friction drum in contact with the rear wheel. Running at 25 miles an hour, the machine will fill a balloon of 35,000-cu.-ft. capacity in 30 minutes, consuming only one quart of gasoline. No difficulty has been experienced from overheating, even after six consecutive testings, as a second, smaller air hose is led directly to the cylinder walls. A highly colored gas is mixed with the air in the sleeve to render visible any leaks in the envelope. Although simple and economical, the appliance's greatest merit is its portability. It is the work of but an instant to load the pump into the sidecar and hasten to any part of the field.



Two Views of the Motorcycle Pump Used in Testing Balloons for Air-Tightness of the Envelope

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¶Accompanied by a government expert, a herd of 104 American dairy cattle recently boarded its own special transport at New York, bound for Havre, France. The cattle were purchased by France to bring health to the children of her devastated regions.

DISINFECTING SHOWER BATH GIVEN THEATER AUDIENCE

Special authority had to be secured from the authorities at Rome when it was desired to hold a large Italian-American celebration during the "flu" epidemic. Permission was obtained, however. The audience of 4,000 persons assembled in the theater at the appointed day, and conversation buzzed before the curtain rose. But not for long. Ushers stepped into the aisles bearing monster syringes, bowed with Latin courtesy, and squirted a cloud of disinfectant down the row of seats until it mingled with the cloud from the next aisle.

An Italian Audience was Surprised during the Influenza Epidemic When Ushers Produced Huge Syringes with Which They Solemnly Sprayed Everyone. The Disinfectant Stung a Bit, but was Rather Pleasantly Perfumed

JARLESS ELASTIC SHUTTLE PREVENTS BREAKAGE

By eliminating the spring between spindle and sleeve, and substituting instead an accessible spring which fits in the notches of a flanged adjusting collar, the inventor of a new shuttle is said to secure greater convenience and efficiency. The shuttle is made elastic longitudinally, thus preventing breakage of the thread and parts due to jars at the ends of the shuttle traverse.

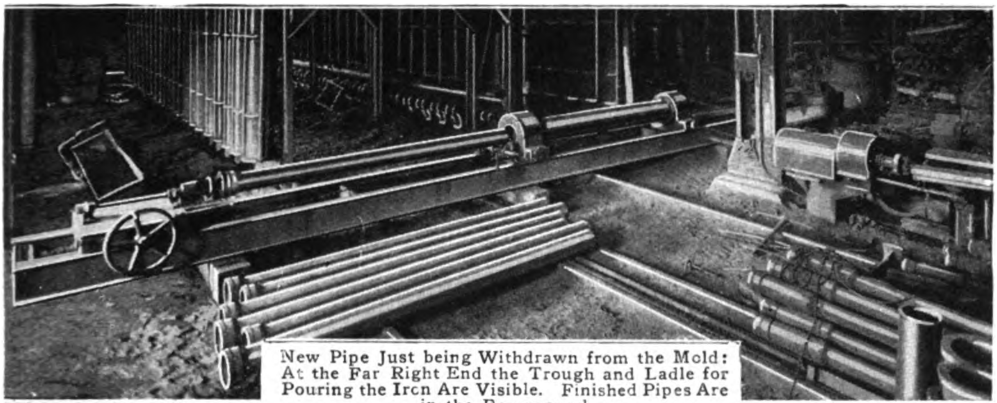
COOPERATIVE TRUCK LINE OPERATED BY FARMERS

The unusual success of a rural coöperative experiment in Maryland has led the Department of Agriculture to suggest similar enterprises in other agricultural sections. The farmers in this venture, who all live about 25 miles from their consuming center, decided a few years ago that the time, expense, and manner of shipping their produce to market, and of securing supplies from the city, were all unsatisfactory. So ten of their number secured from the state a charter for a "Farmers' Coöperative Company," intended primarily for transportation of farm produce, but enabled by the liberal terms of the charter to engage in almost any business.

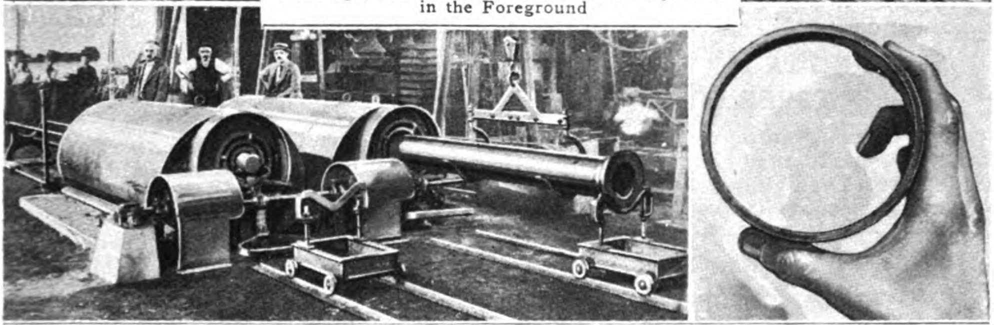
The company was capitalized by the sale of 200 shares of stock at $25 each, making it possible to buy a four-ton truck, hire an operator, and start the service. As most members live along the main highway, they found it convenient to place their produce on small roadside platforms, from which collection was easy. And with low rates and quick service the business grew, another truck was bought, and a small receiving warehouse rented in the city.

Coöperation in this field proving so successful, the company has tried coöperative buying and selling. Members notify the secretary of their needs, he groups them, and buys in the city at wholesale rates. Good results in selling have been effected, too; as in the case of the company's eggs, which reach the city in such fresh condition that the price is considerably increased. It must be remarked that no attempt is made to deal directly with the consumer.

The government warns that a venture of this kind should be started only after a thorough survey and analysis of the local situation. If, then, it seems well to proceed, careful thought must be given to the amount of capital stock advisable, to the election of able directors, to the purchase of efficient trucks, and to the choice of expert, conscientious operators.



New Pipe Just being Withdrawn from the Mold: At the Far Right End the Trough and Ladle for Pouring the Iron Are Visible. Finished Pipes Are in the Foreground



A Closer View of the Rotating Molds is Obtained in the Left-Hand Picture, Which Also Indicates the Method of Withdrawing the Pipe. The Typical Cross Section of Pipe Made by This Process, Seen at the Right, Reveals a Remarkable Thinness and Uniformity of Walls

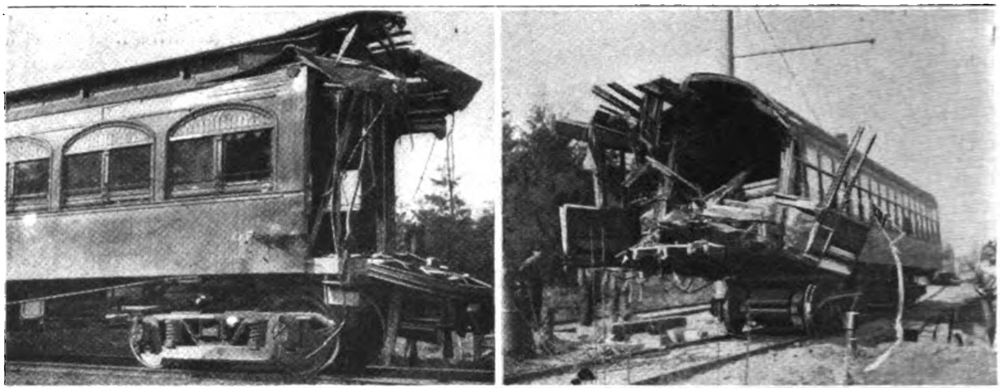
IRON PIPE CAST AND COOLED IN CENTRIFUGAL MOLDS

A curious method of casting iron pipe, devised by a Brazilian engineer, has proven quite successful and is being commercially undertaken in this country and Canada. A rotary, water-cooled cylindrical mold receives the molten metal, no sand being used. The iron, at very high temperature, is poured through a funnel into a trough, which is immediately introduced into the revolving mold and turned over. Centrifugal force distributes the metal evenly, and as graduated ladles are used, there is no waste. The finished pipe is withdrawn a few seconds after the iron is poured, coming out lengthwise quite easily. The walls of pipe so cast are remarkably thin and uniform, and tests indicate greater strength and closer texture than result from ordinary casting in sand. Many experiments in centrifugal casting of iron pipe have previously been tried, but did not prove commercially practical. The success of this system is attributed to the cold mold and the instant withdrawal of the pipe, which hardens as soon as poured.

PUSHCART NOT FORGOTTEN IN PROSPERITY

A business man who is proud of his humble beginning has placed a pushcart in the cupola which surmounts his three-story building. Behind the pushcart he started on the journey which led to his success; so, when this structure was built, he included the cupola in the specifications.

The Owner of This Building Still Keeps the Pushcart with Which He Got His Start; He Built This Cupola for It



The Wood Coach at the Left is Seen to be Only Slightly Damaged, While the Steel Car in the Right-Hand Picture was Crushed for a Third of Its Length, and Its Forward Trucks were Driven Back to the Center

FALLING TRUCK CAUGHT BY PIPE LINE

When the big auto truck in the illustration skidded on a slippery road, and headed for a deep gully, the driver felt his reckoning was at hand. But a friendly oil pipe intervened and checked the descent. No one was hurt and neither machine nor pipe line seriously damaged.

No One was Hurt and No Damage Done to Truck or Pipe Line in This Accident

Lima, Peru, has contracted with a New York firm for a $750,000 hotel to be owned by the city and operated by Americans.

WOOD CAR RESISTS COLLISION WHILE STEEL CAR CRUMPLES

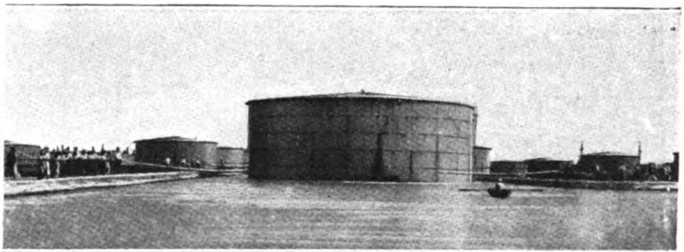
Some shadow of doubt was thrown upon the boasted invulnerability of the steel railway coach by a recent accident north of Seattle, Wash. An electric interurban car of steel and one of wood, met, head-on, at high speed. The front end of the steel car was utterly demolished, the crumpled metal injuring a number of passengers. The forward trucks were forced back to the center of the car. The wood car lost its front vestibule, but few of its occupants were hurt, and it resisted the shock so well that it was able to leave the scene on its own power, while a derrick was needed to remove the steel coach. The verdict of engineers, as reported by a correspondent, is that with two steel cars, the body of one would have been swept from its deck, with disastrous results to the passengers; while with two wood cars, absorption of the shock by the laminated deck beams would have prevented any great damage.

USED THEATER PROGRAMS ARE CLEANED AND PRESSED

Rumpled programs left in the seats by the patrons of one theater are no longer swept into the rubbish bin. Instead they are renovated—cleaned and pressed, in fact. Between 200 and 300 are picked up each night, piled in stacks of 50 each, and pressed flat in a bookbinder's press for 24 hours. Emerging flat and unwrinkled from this process, they are then run through rubber rollers which erase all finger prints and stains. It is said that it is impossible to distinguish these reclaimed programs from those just off the printing press.

GREAT OIL TANKS FLOATED LIKE EGGSHELLS

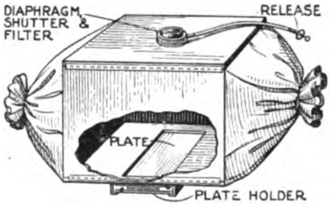
"Yo-ho, and a barrel of oil!" should have been the chant of 20 darkies as they pulled a 33,000-bbl. iron tank down an artificial lake. The scene was certainly unusual, but it represented an ingenious bit of engineering which easily moved five great oil tanks to permit reorganization of the plant. A continuous levee was thrown up around the tanks; water was poured in from numerous fire hydrants, and when it reached a depth of 11 in. the tanks floated like eggshells. A few muscular darkies did the rest. Aside from its convenience, this method moved the tanks with a minimum of torsion on the many plates.



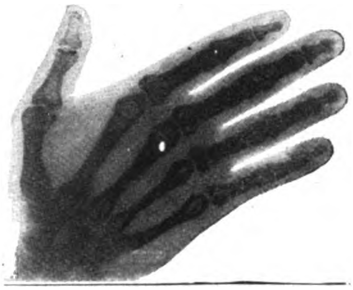
A Small Dirt Levee and Water from the City Fire Hydrants Were the Features of This Ingenious Bit of Engineering. This Is One of the 33,000-Barrel Iron Tanks being Floated to Its New Position

ELECTRIC BULB RIVALS X-RAY IN BONE PHOTOGRAPHY

Everyone has placed his hand over an electric bulb and observed how the red glow penetrates the flesh; and by a few modifications of this common experience a physician has contrived a simple camera that seems to rival the X-ray in a limited field. Into a light-proof box, containing the member to be examined, he admits light from a tungsten lamp, filtered to pass only red rays. Passing through the hand or foot the red light strikes, at the bottom of the box, a photographic plate highly sensitized with an eosin solution. An exposure of one-half second makes the shadow picture.

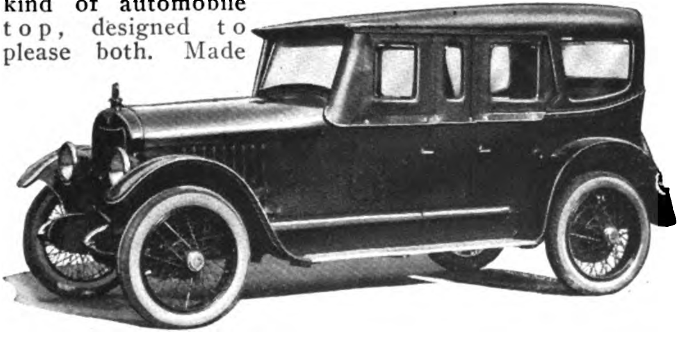


Light from a Common Electric Bulb, above the Shutter, Pierces the Hand or Foot, and Makes an Excellent Shadow Picture on the Photographic Plate



NOVEL AUTO-TOP COMBINATION OF CLOSED AND OPEN TYPES

Out of the dispute between closed-car and open-car advocates has come a new kind of automobile top, designed to please both. Made of a waterproof, leatherlike material, the new top is removable, but does not fold. The plate-glass tonneau sides are fixtures, but forward of that point are removable side curtains, warmly padded, reinforced with steel frames, and having windows of plate glass instead of the conventional celluloid. Channels in the front curtain frames inclose the windshield brackets. An interior dome light completes the sedanlike effect of the ensemble.

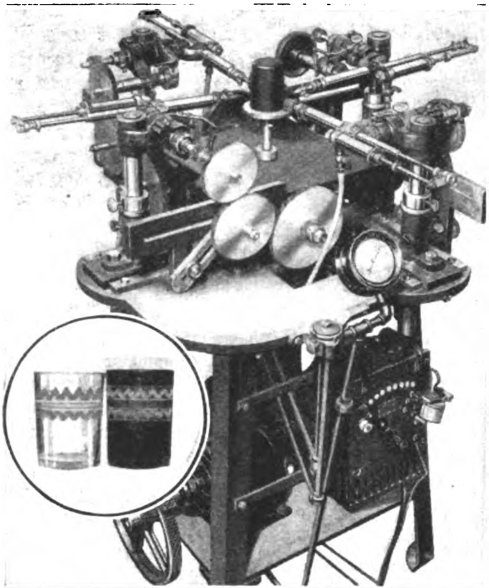


The New-Style Top on This Automobile Is Removable but does Not Fold. All Windows, Including Those in the Side Curtains, Are Plate Glass

¶The increasing importance of stellar observation has caused the Mount Wilson Observatory to drop the word "solar" from its name.

SUCTION HOLDS GLASSWARE ON ETCHING MACHINE

In etching fine glassware with a new machine, the article, a tumbler in this case, is dipped as usual in molten, acid-resisting paraffin or wax. The wax having cooled, the tumbler is inverted on a rotating table, where suction created by an air pump holds it firmly in place. Suction is then used again to move the four electrically driven scratching instruments into contact with the waxed surface, where cams give them a varying motion upon the revolving tumbler. Thus, there is traced in the wax a pattern which corresponds to the cams employed. The scratching finished, the pattern is finally "bitten" into the glass by an acid bath.



The Wax-Coated Tumbler is Shown Here on the Suction Disk of the Etching Machine. An Air Pump is Also Used to Move the Etching Arms into Contact

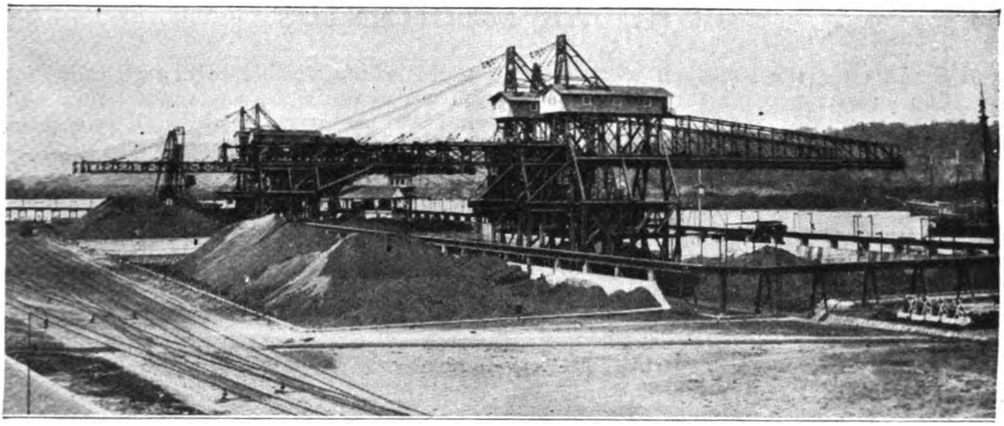
POLICE FORCE PLANS FOR AIR TRAFFIC ABOVE CITY

A police captain has been appointed major in charge of the air branch of the New York City Police Department. His service now consists of only 20 men, but will be expanded as necessary to regulate the future aerial traffic above the city. The fast scout planes which will be used in the work will probably be armed with machine guns firing tracer bullets.

INDIAN BRASS BAND LIVENS TRIBAL FESTIVALS

Since the American Revolution the Passamaquoddy Indians have lived near the mouth of the St. Croix River, in Maine, and have fought in every war on the side of America. The survivors of this farthest-east tribe now inhabit a small reservation near Perry, where they still observe the old tribal festivals, for which their own brass band furnishes the most modern music.

The Brass Band of the Passamaquoddy Indians is Here Pictured in Front of the Reservation Church. Many of the Costumes Are More Than a Century Old and are Decorated with Ornaments of Beaten Silver



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This Is the Coaling Station at Balboa, the Pacific End of the Canal, Whose Huge Plants Are Able to Deliver Coal to Ships at the Rate of 3,000 Tons an Hour. Here, as Well as at the Atlantic End, Vast Quantities of Coal are Stored for Supplying the Canal Shipping, the System as Now Operated Constituting One of Many Improvements Designed to Take Care of Post-War Trade

MAKING THE PANAMA CANAL PAY

A Report to the Stockholders

By E. T. BRONSDON

A FEW years ago you put $5 into the building, maintenance, and operation of the Panama Canal. So did your wife, and so did each of the other members of your family. Perhaps you were not conscious of making the investment. Probably you did not invest directly. Certainly, you have no papers in your vault or box at the bank to show positively that you own one share of stock in the Panama Canal. Yet this is the case. You own one share, no more and no less. Even if you purchased a million dollars' worth of the government bond issues that were devoted directly to the project, you still own but the single share, and equal with you is every other person possessing citizenship in the United States.

What has this $5 been doing? Has it paid dividends, or has it been thrown to the winds? What are its prospects?

The activity of these ninety-odd million five-dollar bills can best be shown in brief by enumerating the costs they have met. These are:

Building	$397,850,000
Repair (extraordinary)	29,033,000
Total	$426,883,000
Annual Expenses	
Interest (3%) on $426,883,000	$12,806,490
Government, operation, maintenance, sanitation, etc.	6,008,000
Annuity to Republic of Panama	250,000
Total	$19,064,490

The story of the building of the canal is history, and need not be touched upon. Through the Titan energy and capability of two men, Goethals and Gorgas, the big ditch was finished in 1914, a little ahead of schedule and with a slight margin remaining of the $400,000,000 expenditure planned.

Certain treacherous features of the terrain conspired to add to this cost, however. During the first year, following August, 1914, when the canal was opened, eleven slides occurred. These were minor affairs, stopping traffic in the canal for a period of time varying between one day and nine days for each. The dredging and repairing was not particularly costly, except that it made shippers fight shy of incurring this sort of delay; most lines that could have used the Panama Canal delayed starting until it could be depended upon more fully.

Then, on Sept. 18, 1915, just as traffic was picking up slowly, came the disastrous slides at Culebra. Hundreds of thousands of cubic yards of bank caved into the canal, and traffic was stopped definitely for seven months. During the time that intervened between the series of accidents and the opening, on April 15, 1916, a new scheme for protecting the banks was initiated; since then it has been carried out wherever the slightest danger of further slides threatened.

This was the terrace or "plateau" system. At the edge of the water, the bank slopes gradually to a level three feet above the canal. Instead of continuing in a slope, or rising in an abrupt precipice, as had been the case at Culebra, Gaillard, and Coffin cuts, the soil then is chopped away to make space for the first terrace. This is ten or more feet in width—varying according to the "overhang"—and ends in another rise. The second rise and those that follow may not be slopes; in most cases they are sheer, like the sides of the blocks of the Great Pyramids of Egypt. Except in two or three instances, it has not been necessary to terrace back farther than 30 ft. from the canal, but often even this amount has called for the removal of sufficient dirt to cover an ordinary city block to a depth of 10 ft. Since the work was done with a thoroughness that nothing less than an earthquake can undo, in this article the costs are grouped with the building expense under the head of extraordinary repair—really part of the first expense, if one would care to view it in this manner.

This is not the total sum, however, which must be considered part of the original investment made by the people of the United States. Up to August, 1918, the close of the fourth year of operation, the average annual expenses slightly exceeded $19,000,000, not taking the extraordinary repair into consideration. A good part of this—viewing the Panama Canal as established, and not discounting for other advantages than the income received—could be called net loss.

The first year of operation yielded a gross income of approximately $5,260,000. The second year—killed by the seven months of entire inactivity, and the resultant inertia of shipping, not to speak of the inroads made by the war—totaled only about $2,400,000.

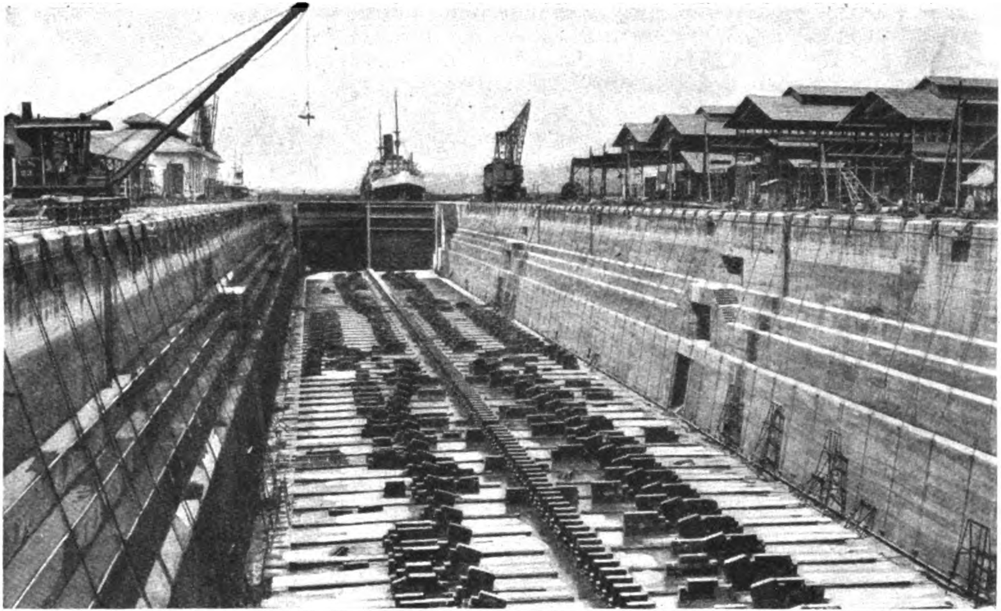
The third and fourth years, due to the fact that a great grain-shipping route was opened between Vancouver, British Columbia, and Liverpool, England, and also that the United States began to call extensively upon Chile for nitrate for munitions use, the income of the canal rose to an average of $617,000 a month.

This brought the total gross income for four years' operation to $22,468,000. The expenses for this period were $76,257,960, leaving a deficit for the period of about $53,789,960. At first blush, it would seem quite evident that we all have wasted our five-dollar bills, investing them in a project that could lose over $13,000,000 a year for us! We could find few commercial or industrial projects with a similar record in which we still would keep faith.

But courage! When the Panama Canal tolls were fixed by President Taft, in November, 1912, the assumption was that it would be inadvisable to charge more for the use of the waterway than the amount charged for passage through the Suez Canal, to wit, $1.20 a net ton for freight and passenger vessels. Charging more than this would have diverted the shipping passing between our eastern seaboard and all west-coast ports of South America, from the Chile nitrate ports southward; it would have sent all carriers plying between Europe and Valparaiso also to the Straits of Magellan, for via the canal these vessels could save only 65 cents a ton in time and distance. This added to the differing fuel costs would make a total saving of from 95 cents to $1.40 a net ton. Obviously the Panama Canal could not hope for all of this latter trade anyway, but with the charge above $1.20 a ton, net tonnage, practically none would use the waterway. For ports like Callao, Iquique, and Esmeralda, of course, the charge might be slightly higher, with the canal route still being less expensive, either from our own seaboard or from Europe, but their trade in peace time is relatively light.

The big nine-knot grain freighters now plying between Pacific ports, both in Canada and the United States, and Europe, can save 20 days in time and $5,500 by taking the canal route. For the shipping between the lumber docks of Oregon and Washington and the Atlantic seaboard, the saving is fully as great. When the Panama tolls are paid—they amount to close to $4,500 on one of these ships—the vessel saves net about $1,000 a trip. If tolls were increased to $1.50 a net ton, as has been proposed seriously in the past, the profit—and with it the reason for using the canal—would be wiped out, and the canal revenues thereby reduced instead of being raised.

This part of the shipping passing through the Panama Canal is, of course, important when the summing up of revenue is being made, but it is still only a small part of the whole question. What is perhaps the greatest reason why rates at the Panama Canal never should exceed those of the Suez Canal is that the United States has decided definitely to make a strong bid for commerce with Russia, China, Japan, and Australasia. In the past, nearly three-fourths of our own shipping—excluding coastal and lake vessels—has been employed in carrying goods to and from these countries. Now, with a large merchant marine as a definite aim, this section offers the most promising opportunity for such development. Ameri-



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The Dry Dock at Balboa, with Its Total Length of 1,000 Feet, Is Fully Capable of Handling the Largest Ship Afloat, and Disposing of Any Demands That may be Made upon It by the Anticipated Enormous Increase of Merchant Shipping through the Canal When America's New Trade Vessels Are All in Action

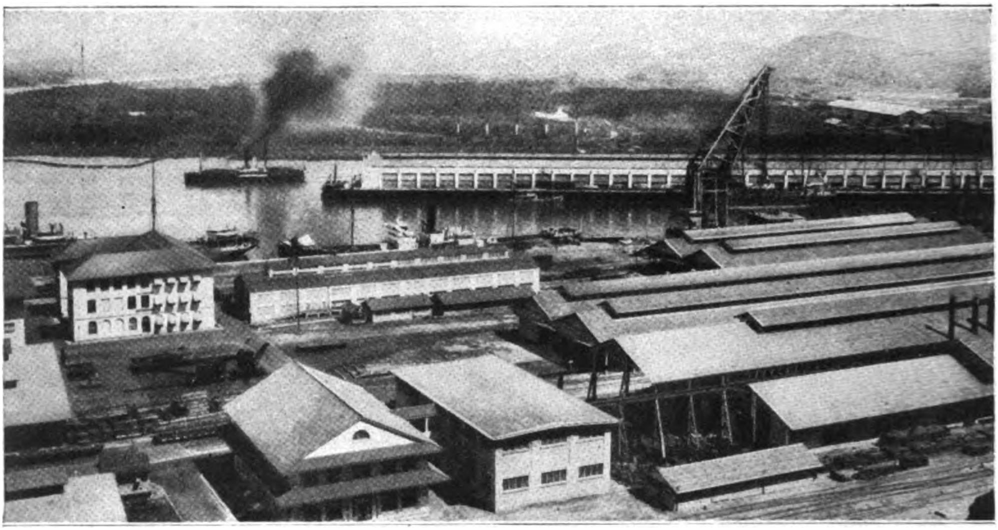
can shipping operates under handicaps, thus far, of a wage scale higher than Europe's, and of higher cost as concerns the vessels themselves. In using the Panama Canal at the present rate, however, this American shipping actually can make Asiatic ports with slightly smaller transportation costs. This is not enough to offset the other handicaps as yet, but there are many schemes afloat by which the difference may be nullified. Raising the canal rates would throttle the greater part of the new marine before it was launched. It would not seem as if the Panama Canal would make much difference to the trade of the United States with the Orient, but as a matter of fact it does. Yankees trade with Australia, with China, with Russia, with Japan, and other countries of the Far East, almost exclusively through New York City. Before the Panama Canal was opened, this shipping had to use the Suez Canal—the trip either this way or around the Cape of Good Hope being more economical than the journey around Cape Horn for several reasons—and therefore, having as a handicap the width of the Atlantic Ocean to swell transportation charges, Yankees were at a great disadvantage in bidding against their European competitors. Now, provided the rates at Panama are kept as they have been, all of this particular disadvantage will have been done away with so far as the new marine is concerned.

It seems, therefore, that the assumption made by President Taft was justified. We cannot protect our investment by raising rates at Panama. We must look in a different direction.

The truth of the matter simply is that when the canal was opened no one expected that expenses could be met by the business of the first year—or indeed, of the first decade. The government estimate placed the canal on an earning basis in 1925, though a few connected with the project were more hopeful of attaining at least an even break between expenses and income several years earlier.

Expenses were not expected to be as heavy, but the European war sent prices on labor and materials soaring. Our own entry into the conflict did not help matters any, so instead of a yearly bill for $17,250,000 as was estimated, we have had to add nearly two million to this. As all costs will descend gradually during the next decade, we cannot expect to get along with the estimated amount for many years to come.

The estimate, made at the time of opening the canal, granted an income of $5,000,000 to the canal from shipping the first year, this amount gradually increas-



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Here Are the Shop Buildings and Pier at Balboa, More Evidence of the Canal's Preparedness for Any Amount of New Business. The Floating Crane Just This Side of the Pier, in the Right Half of the Picture, is Declared to Be the Largest Ever Built, Well Able to Handle Any Work It will Encounter

ing year by year, until in 1925 the gross-income forecast was $19,000,000.

Actually the first year exceeded the estimate by more than $250,000. We have reviewed in brief the catastrophes of the succeeding year. With the great war swinging into its stride, the canal had to give up definitely the idea of coming nearer to clearing expenses. The point for us to bear in mind particularly is that the great project has had no sort of a chance to demonstrate its possibilities. Instead of looking forward to 1925 for the meeting of expense and income, we must grant an extension equal to the period of the war. Whatever deficit is incurred must be charged against the original investment, and paid off by an amortization fund when a profit is made from the enterprise. The estimate gave a profit from the canal of $3,000,000 in 1930, and recommended that this amount be taken yearly for amortization. If all goes now according to schedule, this point should be reached in 1934.

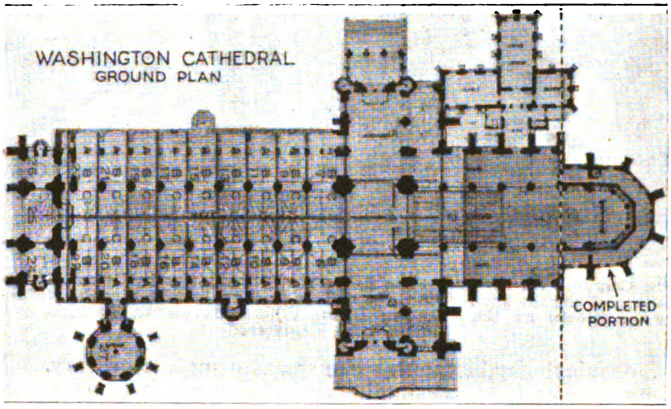
As a matter of fact, these figures take into consideration only the amount of American shipping using the canal that we possessed at the outbreak of the war. In reality we have now, built and on the ways, a new tonnage four times as great as our pre-war total. In addition, American owners now cannot sell American vessels to foreign registry, and the bars have been dropped to permit Americans to buy all the vessels abroad that they wish to purchase—something that had been taboo for years previous to the war.

We are to have a real merchant marine; everyone is confident this is a fact now. Two or three factors of higher cost must be cleared up, but this probably will be done in one way or another inside the next year or two. The belief is prevalent in government circles now that there will have to be little or no subsidy. This is an astounding thing, bearing in mind the conditions which put the old American merchant marine out of business, but there is a solid groundwork of probability. The argument, stated tersely, is: The wage scale paid to seamen and shipbuilders abroad always has been the crux of the difficulty. Although Americans undoubtedly have been able to secure greater efficiency everywhere in return for higher wages, the difference has been too great. Now, however, conditions have changed—permanently, so far as we can see at the present time. Greater changes seem also to be under way. The workmen in Great Britain and the continental countries are out gunning for the low-wage employer. They have tasted power in war time, and it would be strange indeed if the far-reaching unrest, coupled with the terrific work of reconstruction that faces them, did not win for them a wage scale much higher than any which they have enjoyed previously. This, far from being a matter for concern or jealousy to Americans, is a cause for congratulation. Our products and our shipping will stand a better chance in the world markets if it has for competitors labor that is paid as well as ours is—though the latter probability is remote.

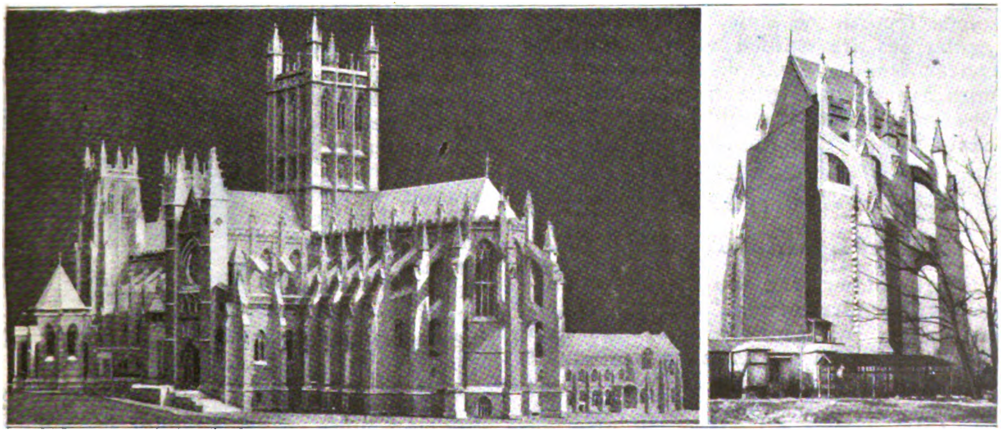
We may look forward to a marine the sailors of which are paid slightly more than the sailors of other nationalities. The difference, undoubtedly, will be largely made up by the advantage which our Panama Canal gives us in certain lanes of commerce. Our new marine will insure the finances of the canal in the future, making a happy bond of reciprocity. In another decade both our merchant marine and our great Panama project should be on a paying basis. In the meantime, for those jealous stockholders who wish an immediate return on their five-dollar bills, we might call to notice the undisputed fact that each year we spend many times the amount necessary to run the Panama Canal on our navy. It is the estimate of conservatives in the Navy Department that owning the canal makes our whole navy at least 50 per cent more efficient as a safeguard—so the jealous investor may, if he wishes, regard his $5 as the premium on a national insurance policy of indisputable merit.

ODD "SLICE" OF CATHEDRAL SHELTERS WORSHIPERS

In days to come a stately cathedral will rise 220 ft. from a lovely wooded hill, near the national capital. It is estimated that, when finished, the structure will cost between seven and eight million dollars, and hold 25,000 worshipers standing, or 7,000 seated. At present, however, only a part of the crypt and the small chapel to the east of the high altar have been completed. Yet, that religious services may be carried on, the chapel has been inclosed by a temporary wall of corrugated iron, making this perhaps the most peculiar-looking place of public worship in America. A good-sized congregation can assemble in the crypt, which is reached by a flight of descending steps at one side.



Religious Services are Already being Held in This Cathedral, Although Only the Part to the Right of the Dotted Line has been Completed. A Wall of Corrugated Iron Seals the Open End



This Is the Architect's Model of a Great Cathedral That will Some Day Crown a Large Hill near Washington, D. C. Its Most Interesting Feature at Present, However, Is the Small Slice at the Right Which has Already been Completed

TEST DEGREE OF INCAPACITY OF CRIPPLED SOLDIERS

Crippled French soldiers draw pensions varying according to the extent to which they are incapacitated for work. Instruments had to be devised, therefore, to test and measure their degree of physical disablement. For measuring joint movements, a simple hinged lever moving over a graduated arc is used in different sizes. Two modified forms of the "ergograph" are applied to the determination of movement and fatigue in large and small muscles. In these, weight-lifting levers operated by the patients rotate register drums, upon which metronomes record the time. Vasomotor irregularities are studied with a pneumatic device; while the various palsies and tremors are gauged by a machine all their own, which takes account of slight movements in any direction.

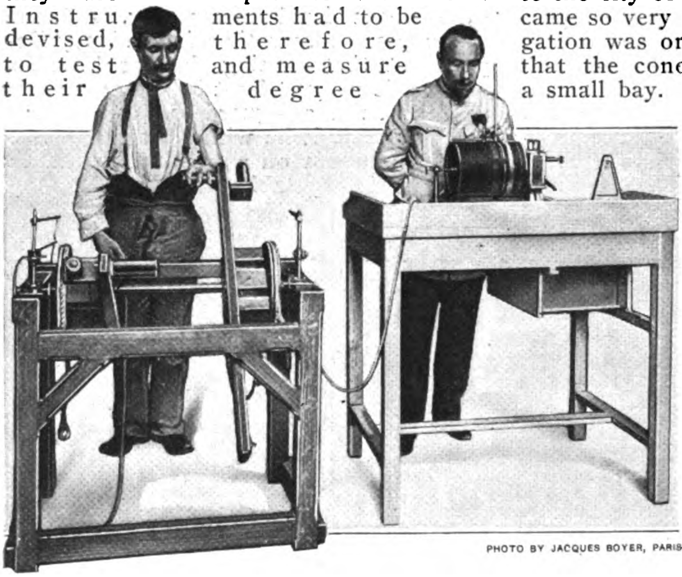


PHOTO BY JACQUES BOYER, PARIS

The Crippled Ex-Fighter at the Left Tries His Muscles by Operating the Levers of the Machine, While the Officer at the Right Studies the Result by the Record on the Rotating Drum, Where Movement, Fatigue, and Time are All Registered

VICTORY MEDAL FOR SOLDIERS OF ALL ALLIED ARMIES

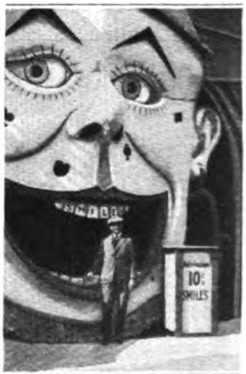
Every soldier who fought in the allied armies is to receive a "Victory medal," the design for which already has been approved by the several governments. The face of the medal bears a winged Victory; the reverse an inscription, "The Great War for Civilization," in the language of the country conferring it, and the appropriate device of arms.

LEAKY LAKE BOTTOM COVERED WITH BLANKET OF CLAY

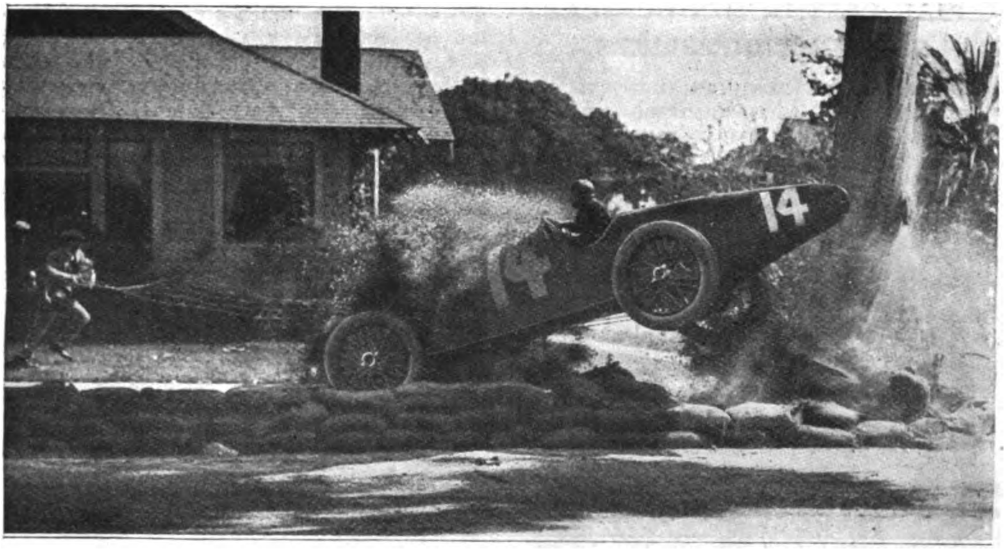
Underground leakage from a natural mountain reservoir which supplies water to the city of Portland, Ore., recently became so very pronounced that an investigation was ordered, and it was disclosed that the condition was most serious in a small bay. So a dike was built across the bay on a substantial riprap foundation. Leakage still continued, however, through the silt-filled interstices of the rocky bottom. To fill these, a raft was built of cedar logs, and equipped with a gasoline engine and propeller, and a wooden hopper of 5-yd. capacity. Securing a mixture of clay and gravel at one side of the lake, the material was dumped on the leaks in amounts depending on their nature. A blanket, one foot in thickness, was usually enough, but for cracks among large bowlders twice that amount was sometimes necessary. Gauges placed in the lake and in various neighboring streams indicate that the leakage has been largely stopped.

HUGE CLOWN'S FACE GRACES THE GREAT WHITE WAY

Novel readers may learn at last what the author sees in imagination when he describes the hero's "fine, open face." The opening in this fellow's face is about eight feet wide. His eyes roll, too, as the pleasure seekers yield up their dimes to see the big show inside.



¶Traveling at an average speed of 172 miles an hour, a British pilot is said to have made the London-Paris flight in the record time of 75 minutes.



IT TAKES MORE THAN SANDBAGS TO STOP A RUNAWAY RACING CAR

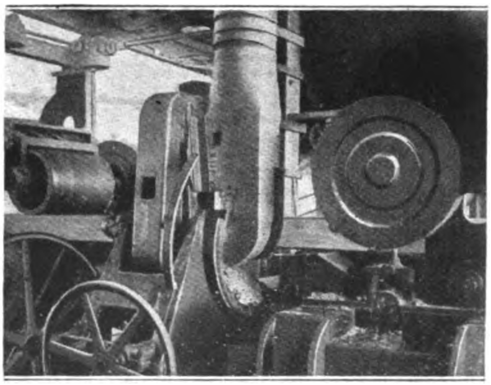
A HIGH-VELOCITY racing car will not take a right-angle turn, and a two-foot barricade of sandbags will not stop it. These principles of physics were demonstrated in a fraction of a second during a recent California road race. The driver of the car, not sufficiently familiar with the Santa Monica course, undertook to round "Death Curve" without slacking speed. Refusing to bend its route, the car took the wall of sandbags like a thoroughbred horse, the rear wheels clearing the top by more than a foot. It wound up in a position at ease on the lawn in front of a bungalow, much to the perturbation of the occupants.

LINCOLN HIGHWAY'S LAST GAP ELIMINATED BY GIFT

With a recent gift of $100,000 it is announced that two Nevada stretches of the Lincoln Highway will be improved, thus filling the last gap in the first American transcontinental highway. It is the sentiment of the donor that the work should properly be done by the state and Federal governments, but he is glad to make a personal sacrifice that the finished road may be presented to the American people as an object lesson. It is felt that the greatest value of this pioneer highway lies in its educative value for the general public.

IMPROVISED PLANING MACHINE FOR BEVELING SHIP PLANKS

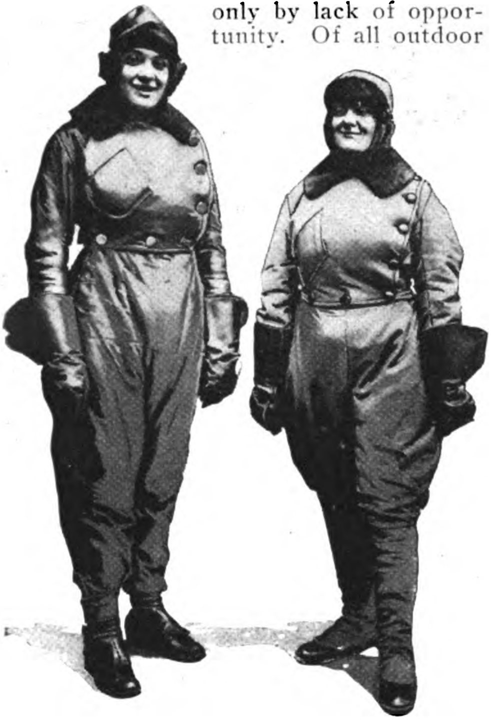
Because of the changing angles of beveling on ship planking and ceiling, much of the work of finishing these surfaces is usually done by hand. In a shipyard at Seattle, Wash., a horizontal timber planer of the ordinary form was reconstructed by removing its frame and substituting a side-cutting ship planer. This machine, with its head adjustable to any required angle, was set between the rollers of the standard planer. With this combination of two machines, the angle may be changed while a timber is being beveled, and work handled from 20 by 20 down to 2 by 2 in. in size. Two or three men can handle all the operations of the machine and do the work of a crew of five to nine on the regular planer. Besides this saving in planing-machine labor, the improvised tool eliminates about 40 per cent of the usual sawing operations on planking and ceiling timber.



Side-Cutting Ship Planer in Place alongside a Horizontal Planing Machine, Taking the Position Formerly Occupied by the Frame of the Latter: The Vertical Pipe Is a Dust Stack

AERIAL COSTUMES NOW READY FOR FEMININE FLIERS

The ladies are taking as kindly to airplaning as they did to automobiling, and doubtless many are restrained from piloting their own planes only by lack of opportunity. Of all outdoor occupations, flying most imperatively demands special costumes. There is already at least one English establishment where a fair customer's request for the "latest" in aerial suits would occasion no embarrassment, and samples of two models would be immediately produced, complete from boots to fur-lined helmet.



Two Models Showing the Latest Styles in Costumes for Ladies Who Seek New Thrills by Navigating the Upper Air, Either as Pilot or Passenger: They are Offered by a Large Mercantile House in London

AIR-SOUNDING SET INSTALLED ON BRITISH STEAMSHIP

Experimental air-sounding apparatus has been installed by the British Air Ministry on a 10,000-ton transatlantic cargo boat as another item in its after-war flying program. The ministry hopes to make the experiment a valuable preparation for transatlantic flying, and also a thorough test of the four appliances used: winch, wire, kite, and meteorograph. Two winches are used, as a matter of fact, one at the ship's bow and one at the stern, thus allowing the kites to be flown from either end to avoid entanglement with the rigging. The mooring cable, which will rise five miles into the clouds, is of fine steel, very similar to marine sounding cable. The kites themselves are collapsible and made of fine linen and bamboo in two types, the larger measuring about 8 by 6 ft. And finally, the meteorograph, the brains of the apparatus, consists of a revolving drum on which pen points register variations in humidity, pressure, and velocity of the air. When actually making soundings, this instrument will be towed four or five miles above sea level in the bigger box kite, while the small pilot kite will fly 400 ft. nearer the ship.

PICTURE SCREEN KEPT SOAKED TO MAKE IT TRANSLUCENT

In the entertainment portion of a Chicago hotel, where motion pictures are frequently shown, conditions demanded the location of the machine behind the screen. Although a fine silk screen was used, results were unsatisfactory until it occurred to the operator to wet the silk. The pictures seen through the translucent wet screen were so brilliant, even in a lighted room, that the practice was continued. The operator applies the water with a sprinkler whenever it appears to be needed. Under this treatment, however, the silk lasts only about six weeks.

METAL-SPRAYING PROCESS NOW USES ELECTRIC ARC

That ingenious art known as metal spraying, developed some years ago, now is further improved by the bold application of the electric arc to its peculiar conditions. The tubes of the former oxy-hydrogen flame are replaced by two wires, of the metal desired for the work, which are fed forward by an arrangement inside the spraying "pistol." The wire points form an arc in front, and a jet of compressed air sprays the melted metal. The instrument weighs less than three pounds.

¶A bulletin from the government fuel administration emphasizes the fact that the greatest single factor in the economy of a steam plant is the way in which the exhaust-steam problem is handled.

CLOTHING PRINCIPLES TAUGHT IN GOVERNMENT COURSE

While all civilized persons are interested in clothes, few really know very much about them. A better acquaintance with textiles would assure keener judgment in buying, and comprehension of design principles would raise the standards of taste, while the skill in care and repair already possessed by most women may be made still more effective. The Federal Board for Vocational Education at Washington, D. C., has prepared, under the title "Clothing for the Family," a general course in the economics of clothes, which includes instruction in all these subjects. The work is in pamphlet form, being Bulletin No. 23 of Home Economics Series No. 1. Particularly valuable and interesting is its critical study of the various materials that go toward making up a complete wardrobe for the whole family. Technical subjects are simplified by numerous diagrams.

SALVAGE FROM OCEAN BEACH MAKES COZY STUDIO

From scattered driftwood, wind-broken branches, and sea-worn stones along the ocean beach, a "nature man," near San Francisco Bay, has built himself a cozy little studio. Making a few expenditures, chiefly for concrete and frame timbers, he was able to complete the structure for less than $100.

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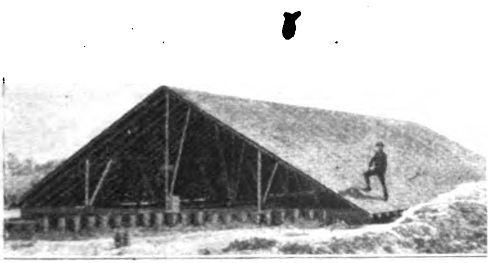
This Dignified Little Studio was Built from Driftwood and Stones Salvaged from the Ocean Beach. Less than $100 was Spent for Other Building Material

SHINGLE ROOF GUARDS ARMY BALLOONISTS

There was not one chance in a thousand of a balloonist finishing a parachute drop in the sticky depths of the gas plant's sludge pit; but the authorities of a large army balloon school avoided all risk of such accident by covering the sticky surface with a substantial shingle roof.


This Roof, at an Army Aeronautical School, Prevents a Balloonist from Falling into the Mire of a Sludge Pit

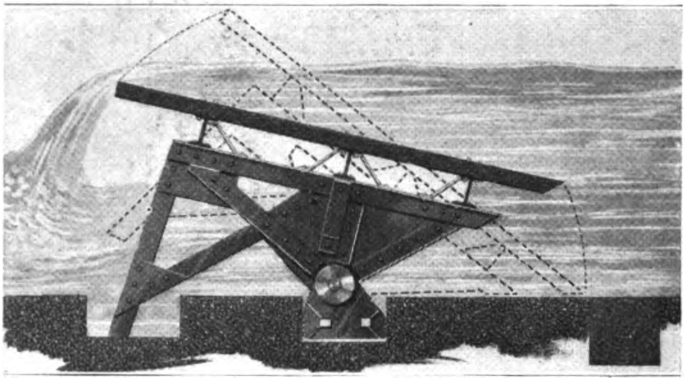
TOOLS CAST FROM NEW STEEL NEED LITTLE MACHINING

A newly developed steel that seems particularly desirable for dies, taps, and other cutting tools, changes its form so little during the hardening process that castings have the appearance of smooth forgings, and need almost no machining. The texture is uniform and close-grained, and castings may be subjected to high temperatures without scaling. Because of this heat-resisting property it is claimed that the walls of annealing boxes may be made much thinner with this material, and that the original shape and weight is retained through many more firings than when malleable or cast iron is used.

ℭA considerable vein of pitchblende, from which radium is extracted, has been discovered near Buckfastleigh, in southern Devonshire, England. The ore yields over 26 per cent of uranium oxide, and the lode will be developed immediately.

AUTOMATICALLY TILTING DAM REGULATES FLOOD WATER

Power rights of a mill, about eight miles up the Gunpowder River from the city waterworks of Baltimore, Md., were threatened by the city's plans for a new dam. City engineers solved the problem by constructing a tilting crest for the dam, which automatically discharged the flood water when the river rose above a predetermined level. The crest, of 12 by 2½-in. timbers, 6 ft. 2¼ in. long, normally presents an upstream face inclined 40° from the horizontal. The steel frame on which it is mounted is pivoted on the top of the masonry dam so that the weight of water passing over it will tilt it forward. This opens a space, 14 in. high, just above the masonry, clear across the dam, allowing the flood water to escape. The crest is made in 27 separate units, with six different tilting points, but all 4 ft. high from the masonry except the center unit. This is 3 in. lower, to provide a normal channel and carry off floating débris. The crest tilts back to closed position when the water subsides.


Tilting Dam in Its Open Position, Releasing the Flood Water under the Toe of the Dam: The Heel Rests in a Keyway Which was Formed in the Masonry for Possible Future Extensions. When the Water Subsides, the Dam will Tilt Back to Its Normal Position, as the Dotted Lines Indicate

OLD TIMBER WALL KEEPS FIRE FROM GREAT LUMBER YARD

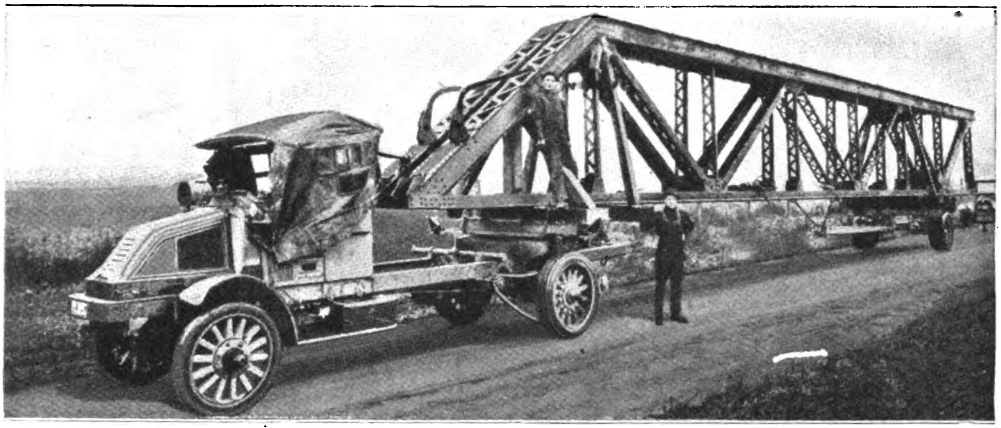
The oily, well-seasoned timbers of two Portland, Ore., lumber mills were recently consumed in a fire that roared for three hours and kept fire fighters a hundred yards away. A third mill was not even scorched, however, thanks to the protection given by a 10-year-old fire wall of 2 by 6-in. planks, laid flat on top of each other to a height of 35 feet.

AMERICA IS NOW INDEPENDENT OF EUROPE'S DYE INDUSTRY

All-American dye industry is now preparing to displace the full list of essential coloring materials formerly imported from Europe. A traveling exhibit of dyestuffs and processes, arranged by a combination of producers of aniline derivatives, is giving public demonstration of that important and interesting fact. Direct comparisons of German and American-dyed fabrics of cotton, wool, and silk, subjected to rigorous tests for permanency, establish the excellence of the domestic product. Indigo, alizarine, carbanthrene blue, alizarine sapphire, and alphazurine are becoming available in commercially adequate quantities. A total of 174 aniline colors under various classifications, with additions that will be made from time to time, assures the textile industry that the old dependence on imported dyestuffs has vanished forever.

HUNDRED-POUND SCRAPBOOK HOLDS HISTORY OF WAR

No subject was ever given so much newspaper space, for so long a period, as the last—we hope—war. To have kept a complete scrapbook on it seems an appalling task. A Seattle, Wash., man, whose hobby is scrapbooks, undertook the effort in August, 1914, never realizing, of course, what he had started. But he bravely stuck to it, and now the book is closed. It weighs more than 100 lb., and contains literally thousands of columns of war reports and pictures clipped from the compiler's favorite papers. Most remarkable of all, it is carefully indexed, making it a really valuable work. It is being used for reference by two army officers who are writing a history of the state's war work.



Bridge Span, Over 100 Feet Long, Hauled 20 Miles by Motor Truck and Trailer: Wood Beams on the Truck Chassis Supported the Front End of the Span, but Because of Its Weight, No Fastening was Needed at the Trailer End Except the Chains That Held the Trailer Tongue in Line

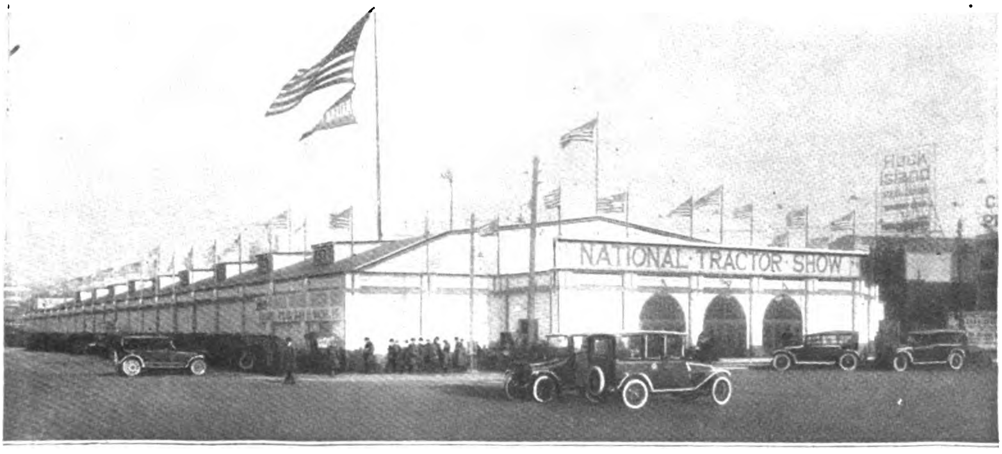
HUNDRED-FOOT BRIDGE SPAN HAULED BY MOTOR TRUCK

There seems to be no limit to the hauling capacity of the motor truck, when a little ingenuity is used in adjusting the load. A steel bridge span, over 100 ft. long, was recently moved 20 miles by highway in Whatcom County, Wash. A platform and braces of wooden beams held the forward end of the span on the truck chassis. The heavy two-wheel trailer was only chained to the steel structure, as the weight of the load made any special fastening unnecessary.

¶Survey shows that 74,541,700 acres of swamp land in the United States can be reclaimed by drainage.

GREAT EXHIBITION HOUSED IN SPECIAL BUILDING

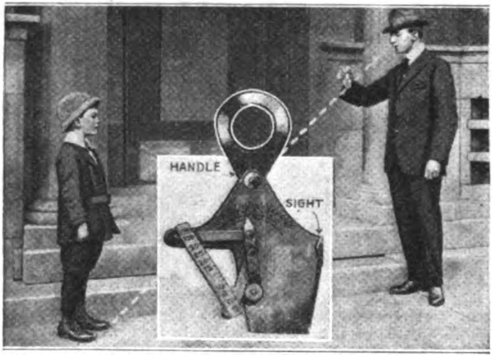
One of the largest buildings ever erected for such short occupancy was recently constructed for the seven days' exhibition of the National Tractor Show, at Kansas City, Mo. The $40,000 structure was more than two blocks long, had a floor area of 110,000 sq. ft., was lighted by electricity, and warmed by 200 steam units that maintained a temperature of 70° despite the prevailing wintry weather. An additional $10,000 was spent for decorations, which transformed the interior into a trellised garden. It is stated that the building sheltered the largest exhibition of tractors and power-farming equipment ever assembled.



This Vast Temporary Building Sheltered the National Tractor Show, at Kansas City, Missouri, during Its Seven Days' Run; 80,000 Persons Viewed Here the Greatest Exhibition of Tractors and Power-Farming Implements Ever Held in This Country or Elsewhere

POCKET-SIZE DISTANCE SCALE HELPS TO FOCUS CAMERA

Focusing scales on hand cameras are often criticized, but it is usually the operator's eye that is at fault. Accurately measuring distances is easier than guessing at them, with a tiny "range finder" now on the market. This celluloid-and-metal pocket piece has a sighting point at one edge and a reading scale at the other. A peculiar feature is its adjustability to the height of the user by turning a pointer. When held before the eye, gravity takes care of the correct relative position of the parts. The user, looking over the sight at the base or ground line of the object, reads the distance directly on the scale.



Use of the Distance Scale is Illustrated in the Large Picture, While the Insert Details the Device Itself. The Point at the Right Side Is the Sight; the Reading Scale Is at the Left; the Curved Center Scale Is for the Height of the User

WALNUT ASSOCIATION WANTS BRANDING MACHINE

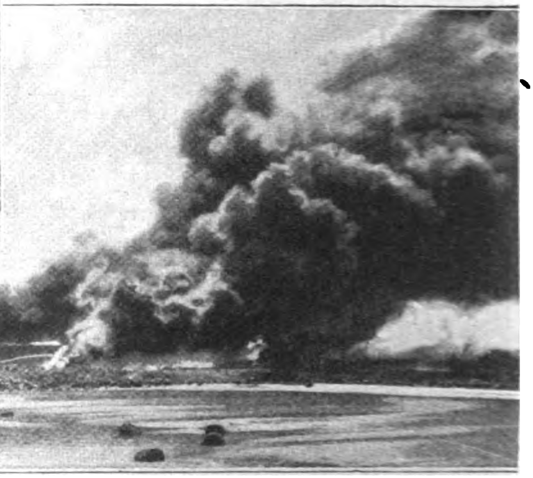
A prize of $10,000 goes to the inventor who first devises a satisfactory machine for branding the shell of each English walnut in a yearly $10,000,000 crop. Each device submitted will be tested by a committee from the large walnut growers' association. The present system of marking each sack with the association label is considered unsatisfactory. Persons interested should communicate with the California Walnut Growers' Association, Los Angeles.

SMOKE COLUMN RISES MILE FROM HONOLULU FIRE

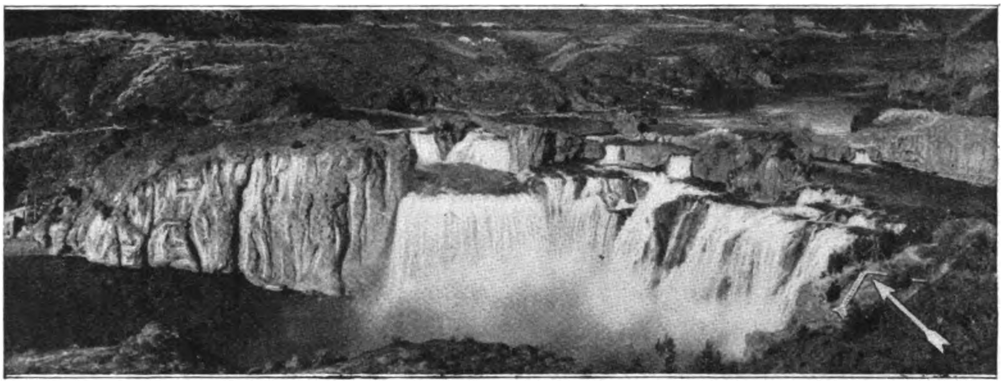
Curious students from the local college measured the dense smoke column rising from an oil fire in Honolulu Harbor and found it 4,600 ft.—almost a mile—in height. Starting from the accidental explosion of a soldering torch, the blaze burned for two days, consuming 500,000 gal. of gasoline and kerosene, and at one time threatening to ignite 30 tons of powder stored 200 yd. away.

Students from a Honolulu College Used Their Knowledge of Trigonometry to Measure the Smoke from This Oil Fire, and Found It to Be 4,600 Feet in Height

¶Mississippi barges are already loading from two complete 300-ft. sections of St. Louis' new 900-ft. municipal dock.



This Oil Blaze Started from an Exploded Soldering Torch, Burned for Two Days, and Destroyed 500,000 Gallons of Gasoline and Kerosene, the Damage being Estimated at $200,000



Beautiful Shoshone Falls, Where the Snake River, in Southern Idaho, Drops 200 Feet in Its Cañon of Basalt Lava, and Out-Niagaras Its Sister Cataract in the East: The Arrow Points the Location of the Giant Stairway Built to the Base of the Falls by the People of the Valley

BALLOON OBSERVERS TRAINED ON MOUNTAIN PEAK

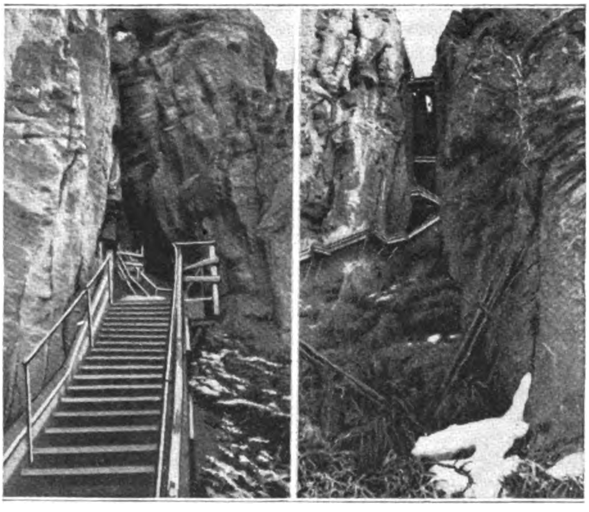
Cadets attending the Army Balloon School, at Arcadia, Calif., seeking commissions as observers, are now being given their preliminary training upon the summit of Mt. Wilson, near by. In the making of a balloon observer there is always a certain amount of training that must be undergone to accustom the student to the appearance of the earth, and points and objectives thereon, from a high elevation.

This preliminary training is made especially difficult when carried on from the basket of an observation balloon. The student is usually made more or less "seasick" by the constant movement of the balloon basket in the air. He is further handicapped by the fact that, whenever the balloon basket moves, it seems to him that the landscape has shifted and that he has remained in a stationary position all the time. This movement of the basket causes the untrained cadet continually to lose sight of objects upon which he desires to center his attention.

Training on the mountain peak eliminates much of this difficulty. The same effect of elevation is obtained as from the balloon, and, besides, the cadet has the advantage of acquiring his early training from a stationary position. Furthermore, classes of 25 or 30 men may be taken to the mountain top and trained by a single instructor, as compared with two or three that could be taken in a balloon basket, thereby saving considerable time.

SHOSHONE'S GIANT STAIRWAY REACHES BASE OF FALLS

Because there was no other way for tourists to reach the foot of Idaho's Niagara, the magnificent Shoshone Falls, the people of the Snake River Valley built a stairway. It is an extraordinary stairway. It goes down, for 300 vertical feet, through a cleft in the towering cliffs of Shoshone's basalt cañon. Sometimes it hugs one wall of the great fissure; sometimes it bridges across to the other side. Here and there it passes through veritable caverns, as the rugged walls meet overhead. But at all points it is safe for the traveler, for its location was selected only after weeks of study. Its supports are iron bars imbedded in the solid rock and rein-



At the Left, Shoshone Falls Stairway is Seen Emerging from Its Rocky Cleft. At the Right Is a Distant View of the Whole 300-Foot Structure forced with heavy timber braces. The long stair, which starts on the cliff 50 ft. above the falls, is divided into many flights. On the landings between them are benches; they are needed, for the steps, cut from 2-in. plank, number over 300. The scenic reward for descending them, however, is extremely liberal. Funds for building the stairway were provided by popular subscription.

MOTORISTS WARNED TO WATCH FOR LANDING PLANES

An airplane in landing slows down to about a mile a minute; but this is fast enough to make it dangerous for anything it may hit. To avoid accidents, large signs have been placed along all roads traversing a government aviation field, advising very careful inspection of the skies before entering the dangerous areas. The "sky" is a big thing for one man to inspect; even experienced airmen sometimes find it hard to locate a flying plane which they know is within a short distance.

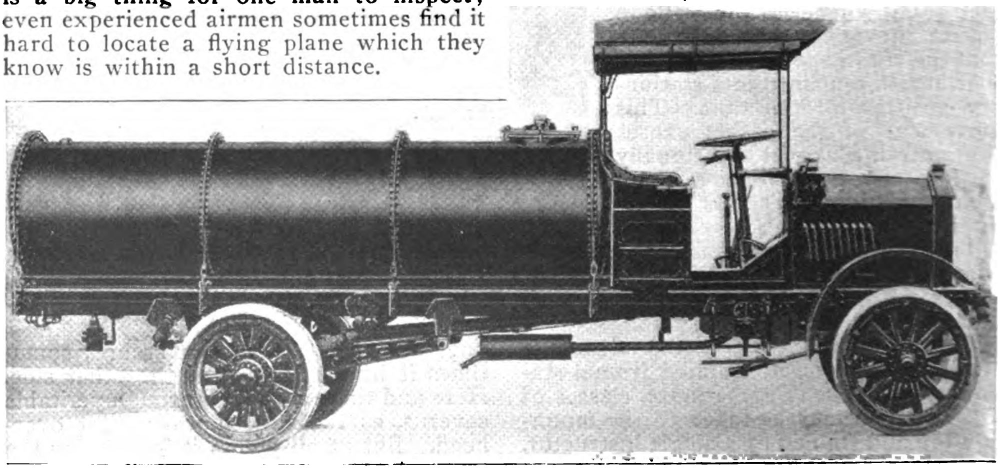
The Familiar Warning at Railroad Crossings Has a New Rival in This One on an Aviation Field

ROOSEVELT'S BIRTHPLACE BOUGHT AS MEMORIAL

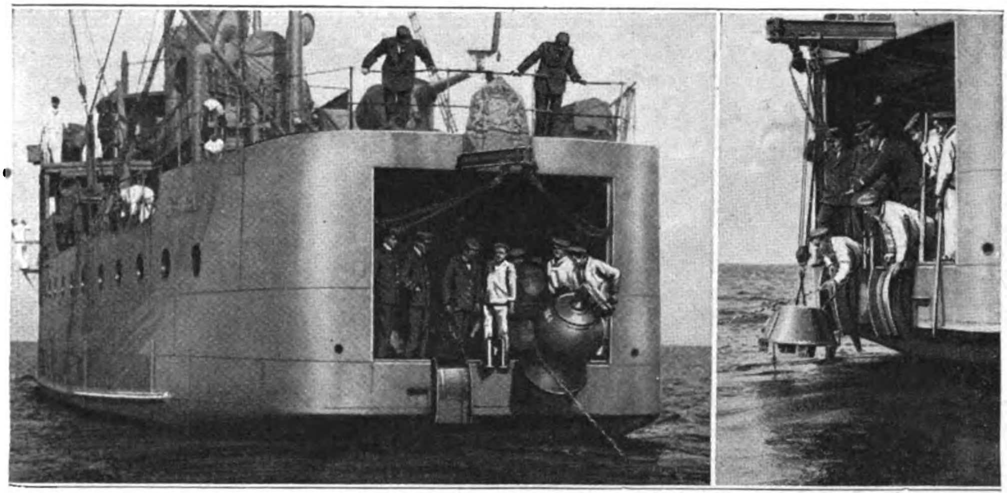
Colonel Roosevelt once protested against "meaningless mausoleums and monuments to the dead." Accordingly an organization of women, formed to perpetuate his memory, has bought his birthplace in New York with the intention of making it more than a memorial; they would make it a busy center of citizenship activities; would have men, women, and children leave its assembly halls resolved on better citizenship and a deeper love for America. The association is attempting to interest women in all parts of the United States in the undertaking.

TEN THOUSAND DRINKS TRAVEL IN ENAMELED TANK TRUCK

Anticipating an unprecedented rush for mild beverages this summer, a huge steel tank lined with glass enamel has appeared as a new form of motor-truck body. The tank's capacity is 658 gal., which divides into 10,528 half-pint drinks. It is made in three sections, gasketed and bolted together, and easily taken apart for cleaning. The silicate enamel used is seamless, impervious, and noncorroding, and is unaffected by expansion or contraction of the steel upon which it is fused. A manhole with enamel-lined cover is fitted with a 2-in. intake connection. The outlet cock, of the same size, at the rear may be padlocked. A 3½-ton truck chassis forms the mounting, from which the tank is readily removed.



Steel Tank of 658 Gallons' Capacity, Lined Throughout with Seamless Glass Enamel, Mounted on a Three and One-Half-Ton Motor-Truck Chassis: The Three Sections, Bolted Together as Seen, are Readily Taken Apart for Cleaning



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Dutch Mine Sweeper "Medusa," Taking Aboard a German Mine Found Floating in the North Sea, Where Many of These Concealed Menaces Still Threaten Peaceful Navigation: At the Right the Same Ship is Observed in the Process of Setting Out a Mine Anchor

DUTCH NAVY'S MINE SWEEPERS STILL SCOURING NORTH SEA

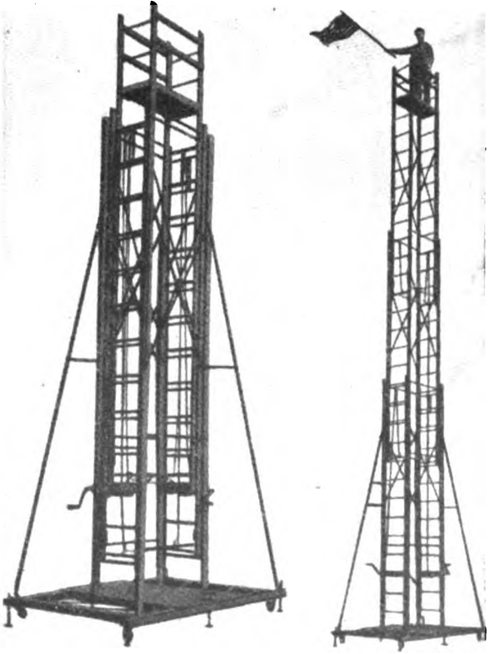
Germany's fleet is gone, but in the North Sea many mines still float, held dangerously out of sight by their anchors and constituting a constant menace to peaceful navigation. So the square, ugly forms of the mine sweepers are a welcome sight as they go about their beneficent but hazardous task of cleaning up the sea. The Dutch navy has found a great deal of this necessary work to do, and its mine-scattering and sweeping equipment is kept busy.

BUILDINGS QUICKLY ERECTED WITH WOODEN NETTING

Several exhibition halls and assembly rooms have been built in Norway by attaching to the uprights a "netting" fashioned from wooden rods about a third of an inch square in cross section, which are bound together with tin-plated iron wire, and subsequently covered with a durable plaster. Structures of this sort are easily and quickly constructed, and are said to be useful even in wintertime.

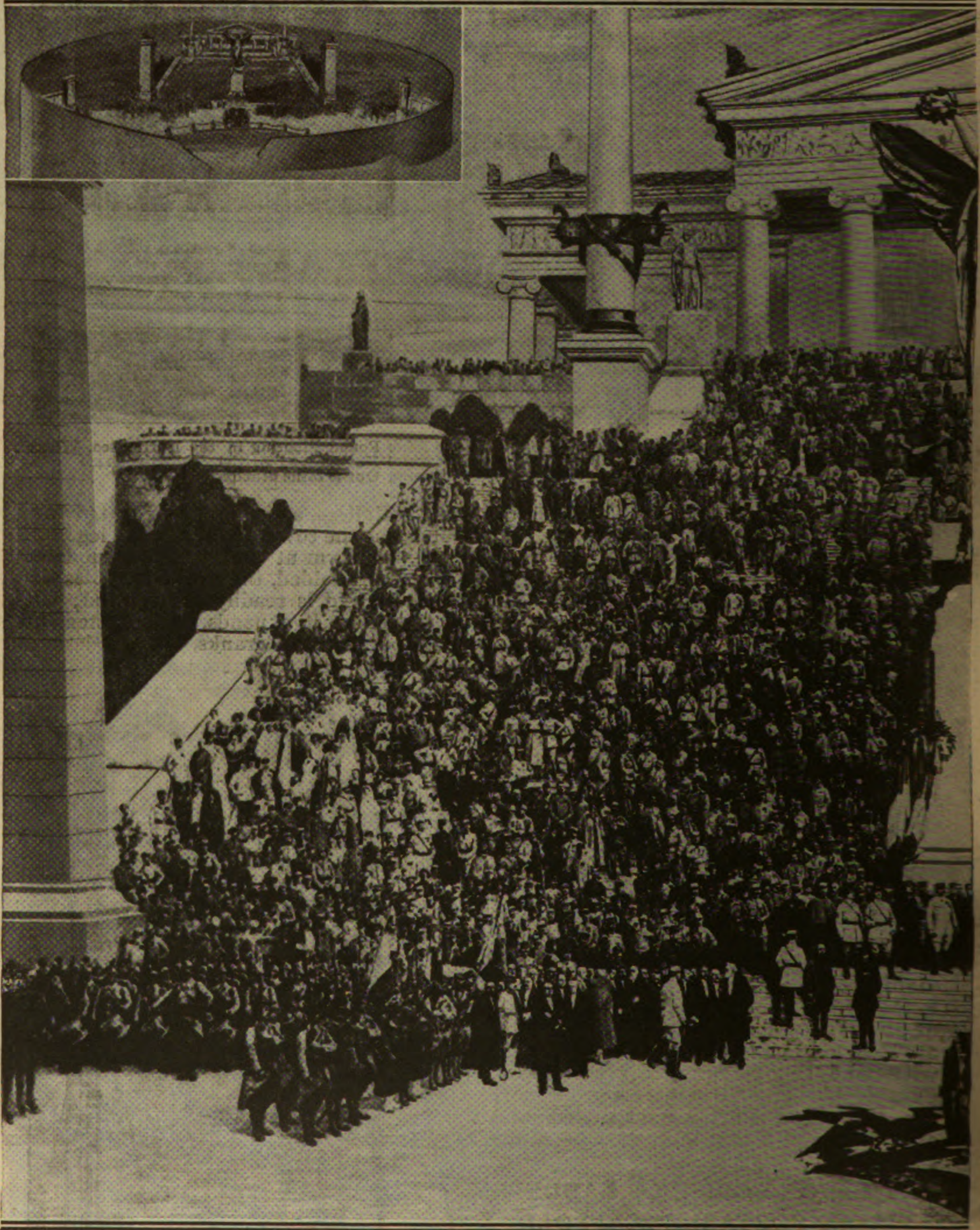
EXTENSION TOWER OF LADDERS MAKES PORTABLE SCAFFOLD

For work above stepladder range there is now to be had a portable telescopic tower of ladders, solid and safe. Two extension ladders, rigidly braced together with steel, rise vertically from a broad base. Rollers are provided for moving, but in use the tower rests on solid legs. A railed platform at the top accommodates two men. Folded, the tower occupies little space and is readily transported; but when set up it expands, by a system of ropes, drums and cranks, to any desired height up to 40 ft. or so.



Left View Shows the Ladder Tower Collapsed; at the Right It is Seen Extended for Work. Each Ladder Consists of Three Parts

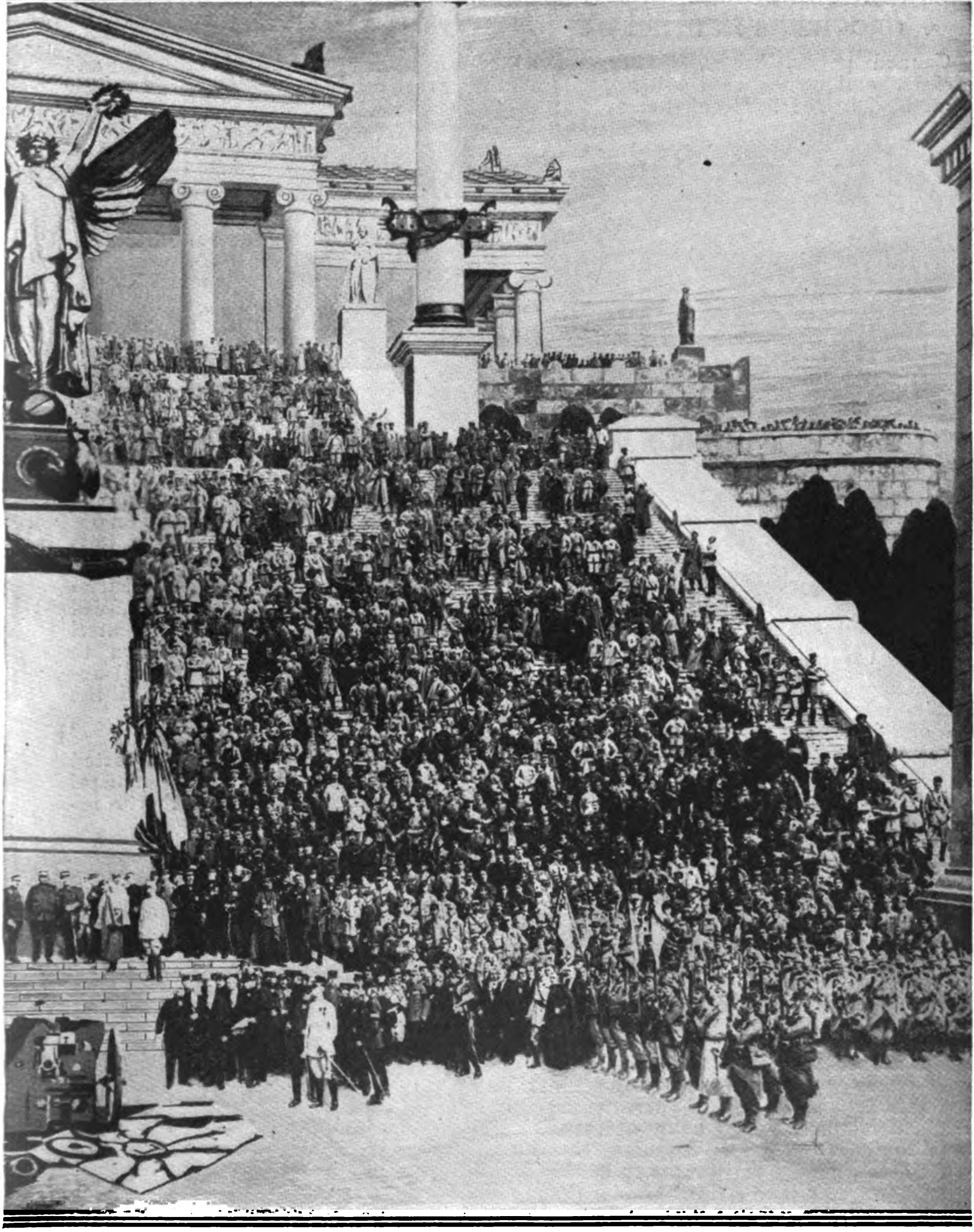
COLLECTION OF HERO PORTRAITS FILLS CENTER



PHOTOS BY HENRI MANUEL

KNOWLEDGE that the figures in the foreground are four feet tall gives one some idea of the heroic propor
now completed after five years' painstaking toil. Along its 400-ft. length, which is arranged, as illustrated
Sea to Switzerland, as it would appear to an airman flying parallel with it. Rolling hills, winding roads and rivers,
in nature. And in the center of the landscape is set the Temple of Heroes, with a Winged Victory dominating
allied nations, soldiers, sailors, airmen, nurses, diplomats, even postal clerks, each one drawn with the most

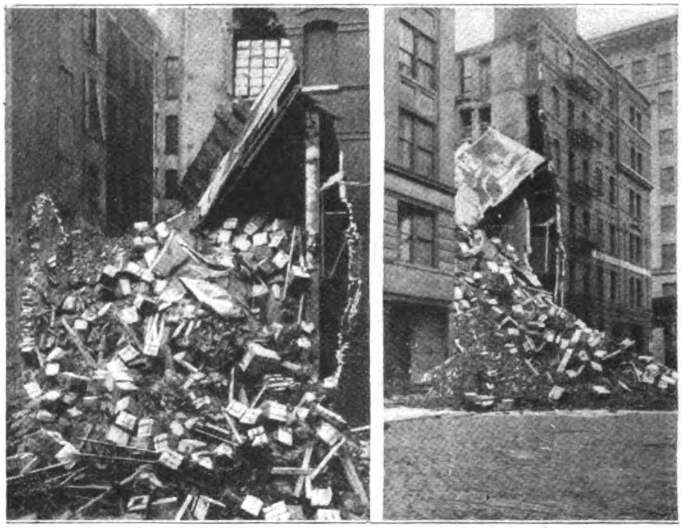
OF HUGE PANORAMIC PICTURE OF BATTLE FRONT



tions of this French painting, shown half finished in the Popular Mechanics Magazine for November, 1917, and in the insert, in a circular exhibition hall near Paris, is pictured the whole western battle front, from the North villages nestling in the valleys, Rheims, Verdun, and other war-torn cities, all are spread before the spectator as the broad steps. Crowding the steps and porch of the temple are arranged the elect of France and the other careful attention to details, secured from life or photographs of the dead.

WAREHOUSE COLLAPSE SPILLS GROCERIES IN STREET

Canned goods, bricks, plaster, nuts, girders, and wine were all hopelessly scrambled in the loud collapse of a six-story New York tenement, which had been converted into a grocery warehouse. No one was hurt, although three men were at work on the top floor when the building began to groan and crack. They were able to descend by the fire escape which was luckily untouched.



Quick Use of the Fire Escape Saved Workmen from being Crushed to Death in This Confusion of Groceries and Rubble. The Warehouse Was Formerly a Tenement and had been Loaded Far beyond Its Strength

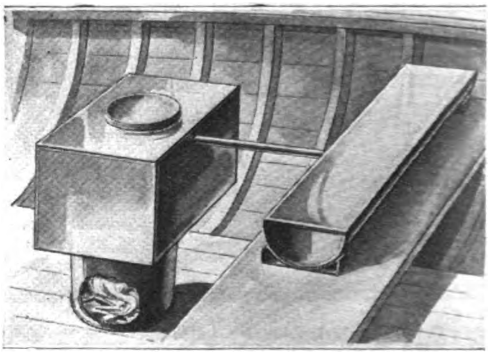
FIGHT AGAINST YELLOW FEVER TO BE RENEWED AT ONCE

The opening of the Panama Canal and the consequent establishment of new trade routes called the attention of scientists some years ago to the danger of a world-wide yellow-fever epidemic. As a result a commission visited all affected areas in Central and South America in 1916, and returned, declaring that, with the extermination of the mosquito, the complete eradication of the plague was possible. So, in January, 1917, a program was drafted—to be postponed indefinitely on America's entrance into the war. But the work of the commission has now been renewed, and it is announced that Doctor Gorgas, Surgeon-General (retired), U. S. A., will shortly sail for Central and South America to coöperate with local authorities in a final extirpation of the plague.

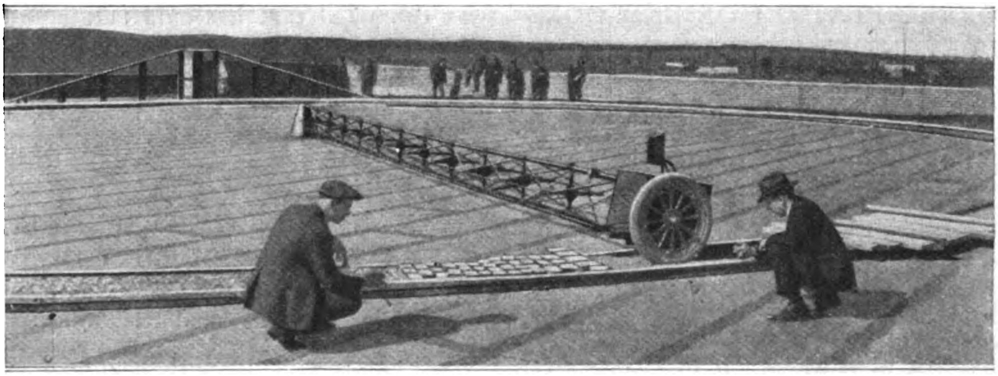
¶Norway has a factory which is reported to obtain aluminum from a mineral known as Labrador stone, hitherto regarded as valueless.

HARD-TACK CAN AND PUMP PIPE SAVE SHIPWRECKED SAILORS

When the "Dumaru," U. S. Shipping Board steamer, was struck by lightning and abandoned off the coast of Guam last October, 32 persons were crowded into a single lifeboat. The scanty supply of fresh water was exhausted on the 13th day, with no help in sight. Then the mechanical instinct, spurred by necessity, came to the front. The desperate castaways tore a pipe from the boat's bailing pump, connected it to a tin container that had held hard-tack, and dipped the end into the now empty water tank. A metal bucket served as a stove; oars, shoes, parts of the boat went in as fuel. As the salt water boiled in the hard-tack box, the tank, cooled by the sea, turned the steam into life-giving fresh water. When land was sighted on the 24th day, the crude still had saved 14 lives.



Crude Still Which Saved the Lives of Shipwrecked Sailors Last Fall: The Bucket Stove and Hard-Tack Box, at the Left, Sent Steam from the Salt Water through the Pipe to the Tank, at the Right, Where It Condensed into Pure Drinking Water

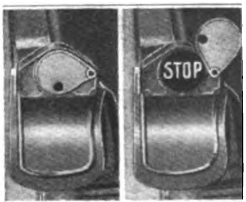


Curious One-Wheel Car and Circular Speedway Located on a Roof Top in Denver: It is Used for Testing Tires, the Path of Which may be Obstructed with All Manner of Hazards, Giving a Genuine Rough-Road Test at 35 Miles an Hour

BUMPY SPEEDWAY ON ROOF TOP IS ONE-WHEEL TIRE TESTER

A motor speedway on a roof, over which races only one car with only one wheel—so far it looks like an old-fashioned conundrum. Actually, though, it is a serious and useful device for giving automobile tires a real road test in advance. The "speedway" is a large circular track, wide enough for one wheel, and varying in surface from smooth cement to broken bricks, sand, and mud. There is even a 45° grade at one point. The single wheel is mounted on the end of a long steel arm pivoted at the center of the circle. A small car carries the electric driving motor and controls, and enough weight to equal service conditions. It runs continuously at about 35 miles an hour, with the tire under critical observation all the while. The roof of a Denver factory is the location.

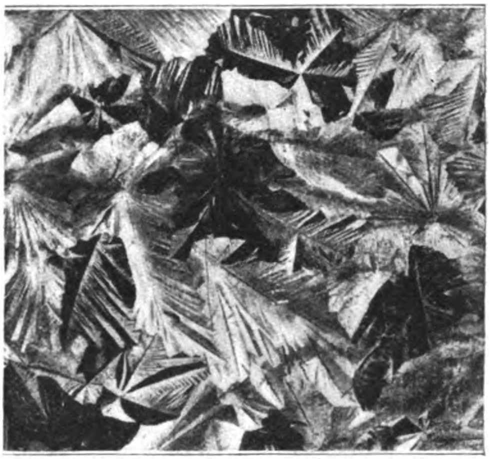
WARNING SIGNAL DISPLAYED AS BRAKES ARE APPLIED



Equipped with the latest automobile safety signal, the motorist may proceed to forget all about it. A small pipe connects the intake manifold to a valve that opens on depression of the brake pedal, thus lifting the cover from an illuminated warning. It follows that the signal will automatically warn a machine in rear each time the brakes are applied for a stop or turn.

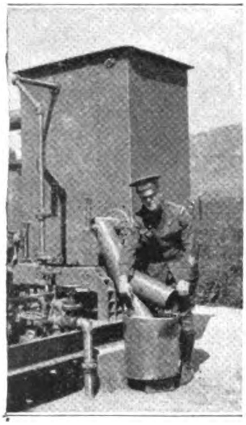
BETTER GALVANIZED IRON BY NEW PROCESS

Valued for its weather-resisting qualities, galvanized iron or steel has long been produced by dipping sheets of the metal into molten zinc, which deposits itself as a coating of small crystals or spangles. Occasionally, however, sheets have been produced with large spangles which, it was found, improved both the appearance and the noncorrosive qualities of the product, and hence increased the price it would bring. So one plant has raised the value of its output by treating high-grade molten steel with an alloy containing titanium before rolling it into sheets and subjecting it to the zinc bath. It is claimed that 75 per cent of the treated sheets emerge from the bath with the large spangles desired.



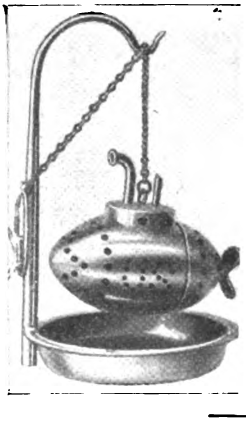
These Large Spangles on Galvanized Iron Lengthen Its Life and Improve Its Appearance

OVERINFLATION OF BALLOONS PREVENTED BY WATER VALVE



When a balloon is filled to capacity with gas, the addition of more may rip the bag. As an automatic safeguard against this danger a two-way Y-tube is introduced into the hydrogen manifold of the gas plant, one arm fitting into the sleeve which carries the gas to the balloon, the other being immersed in a pail of water. It is obvious that when the envelope is filled further gas will bubble out of the pail, enabling the attendants to close down the plant at once.

SILVER "SUB" WITH TEA CARGO SUBMERGES IN SAMOVAR

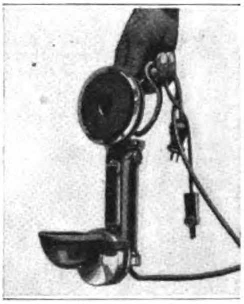


The Boston tea party knew nothing of submarines, but the party of today uses one as a tea ball. The "sub," less than two inches long and very fat, is made of solid silver. It hangs, while in "dry dock," by a silver chain from a silver derrick, with a tiny basin below, to keep the drip off the tablecloth. By grasping the propeller the "hull" is opened to admit the charge of tea.

AIRPLANE CARRIES DOCTOR TO HIS PATIENTS

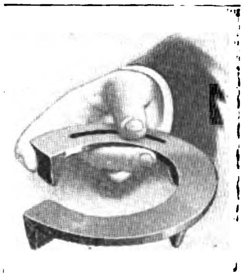
Along the ribbonlike islands of sand and swamp that parallel the North Carolina coast for more than 100 miles the government maintains a chain of coastguard stations, seven or eight miles apart. Slow-going boats have long been the only means of transportation; but when 200 inhabitants fell prey to Spanish "flu," it was computed that it would take a full month for the government doctor to visit them in this way. So the energetic health officer rode to the naval base at Hampton Roads, secured two flying boats, with pilots and mechanics, and visited every station in one day.

GERMAN TRENCH TELEPHONE HAS TELEGRAPH BUTTON



When talking was dangerous, the German soldier used his hand telephone for telegraphing. A push button in the handle, just where his thumb rested, was the key by which he changed his words to dots and dashes. The instrument is of the usual hand-microphone type, with a receiver at one end, a transmitter at the other, and a finger switch in the middle. The long mouthpiece folds in and covers the switch while carrying. Plug-ended cords allow connection anywhere.

NONSKID HORSESHOE MADE FOR PITCHERS



The attention of quoit throwers is directed to the four balanced calks on this patented horseshoe, which the inventor maintains will prevent wabbling through the air, or skidding on impact with the ground. He also provides a slit to secure tape or chamois skin in case the fingers of the throwing hand become sore or the player desires a larger grip.

¶The coöperation of a British battleship in midocean, and special forecasts from the weather bureau of the British air service, will be at the disposal of any American or British airman attempting the transatlantic flight in an airplane.

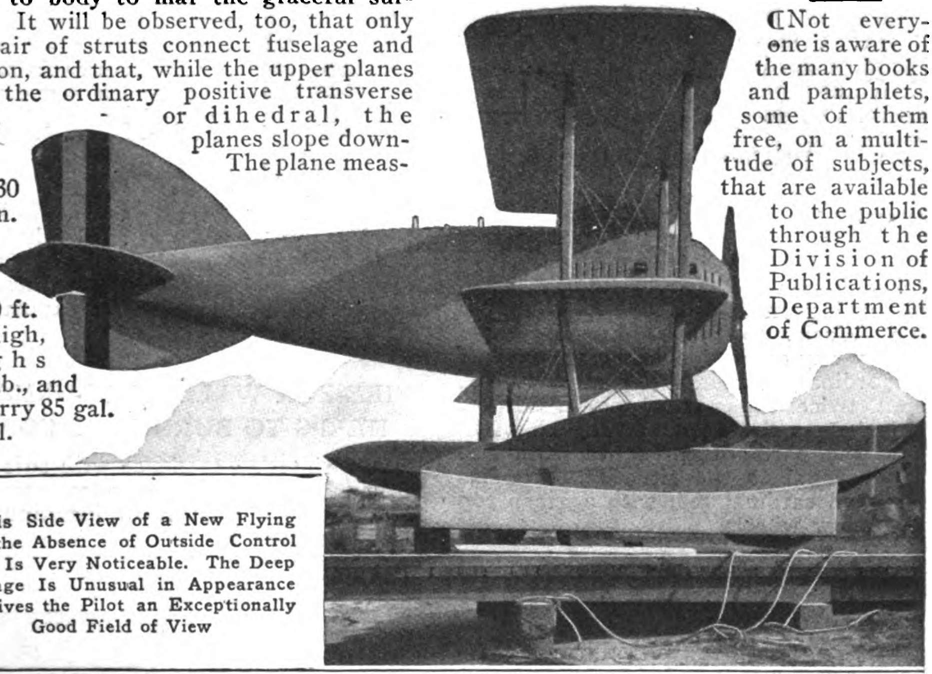
FAST FLYING BOAT HAS GRACEFUL LINES

Driven by a 12-cylinder Liberty motor, a flying boat recently put on the market attains a maximum horizontal speed of 130 miles an hour, with a minimum of 62. It is a development of a speedy land machine intended for mail carrying, from which it differs chiefly in having a greater wing span and two sets of struts. In appearance it is very pleasing to the eye and rather unusual, as the fuselage is deep, and streamlined very effectively, with no control wires or struts from wings to body to mar the graceful surfaces. It will be observed, too, that only one pair of struts connect fuselage and pontoon, and that, while the upper planes have the ordinary positive transverse angle, or dihedral, the lower planes slope downward. The plane measures 30 ft. 9 in. long, 36 ft. wide, and 10 ft. 7 in. high, weighs 3,650 lb., and can carry 85 gal. of fuel.

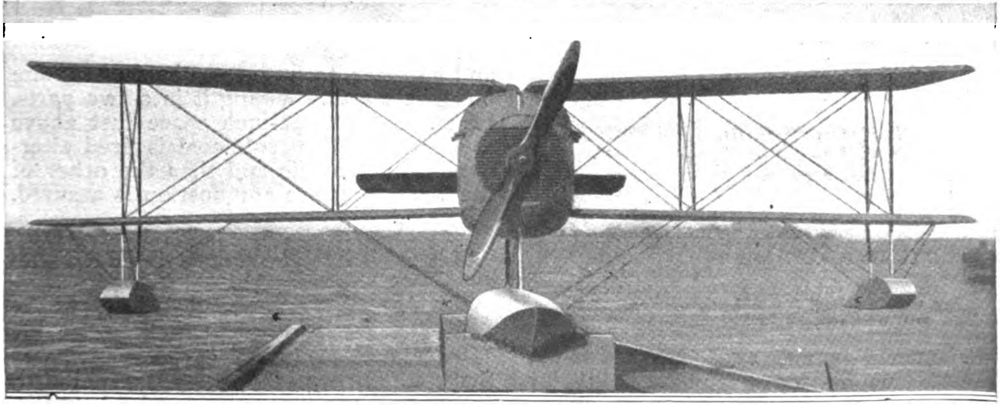
MORE REPUBLICS IN WORLD THAN MONARCHIES

Before the war the number of republics and monarchies in the world was about the same, but it is now computed that only 21 monarchies remain, compared with 29 republics. Germany, Austria and Russia have been included among the latter. China is the largest republic with 400,000,000 inhabitants; San Marino comes last with only 11,000. The number of republics will probably soon be increased still more by the formation of new states.

¶Not everyone is aware of the many books and pamphlets, some of them free, on a multitude of subjects, that are available to the public through the Division of Publications, Department of Commerce.



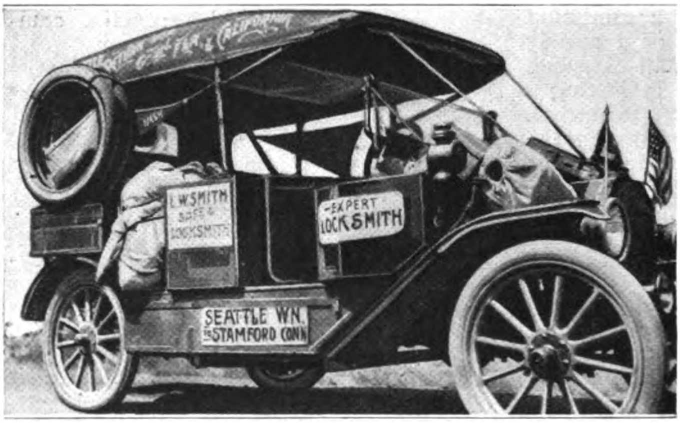
In This Side View of a New Flying Boat the Absence of Outside Control Wires Is Very Noticeable. The Deep Fuselage Is Unusual in Appearance and Gives the Pilot an Exceptionally Good Field of View



In Developing This Flying Boat from a Fast Mail-Carrying Machine, the Wing Span was Substantially Increased. Note the Opposite Dihedrals of Upper and Lower Planes

LOCKSMITH CROSSING COUNTRY LIVES AND WORKS IN AUTO

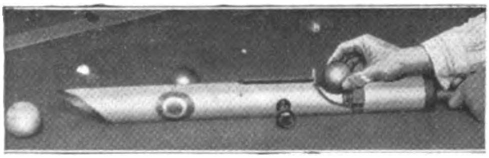
A complete locksmith's shop, a camping outfit, and the smith himself, all packed into a small and well-used auto, are making an 18-month tour from Seattle, Wash., to Stamford, Conn., and back by way of Florida. The car, with its extraordinary outfit, weighs 3,600 lb., about twice the normal figure for its kind; but as the owner made it himself, using the parts of three others, it has proved equal to the situation. He has it painted cardinal red, with a green top and yellow wheels.



This "Light" Car Weighs 3,600 Pounds When Equipped with a Complete Locksmith's Shop and a Camping Outfit. The Smith is Driving It from Coast to Coast, and Its Red, Green, and Yellow Coloring Attracts Customers in Every Town

PLAY GAME OF POOL WITH GUN INSTEAD OF CUSTOMARY CUE

"Shooting" a game of pool applies literally to a new method of playing the popular indoor sport. The cue becomes the plunger of a spring gun, consisting of a tube about 30 in. long with an opening near the breech to receive the cue ball. The muzzle is cut at a slant, with the longest side on top, giving a point for sighting. A side handle assists in holding for difficult shots.



COPYRIGHT KEYSTONE VIEW CO.

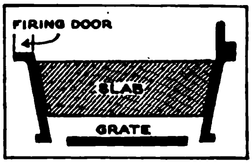
This Spring Gun Takes the Place of a Cue in Shooting the Cue Ball for a Game of Pool. As will be Seen, It Is Breech-Loading

FOREIGN MARKETS EAGER FOR AMERICAN LUMBER

Russia and Austria-Hungary formerly supplied the world with almost half its lumber. But now, facing the greatest demand ever known, reckoned at 100,000,000,000 ft., buyers learn that the Germans in Galicia and the Bolsheviki elsewhere have completely destroyed all Russian mills, and that Austria-Hungary, while actually rich, is yet economically impotent. Hence buyers are arriving in America from Europe, South America, Australia, and Africa, eager for every bit of lumber that available cargo space can handle. With such a market it seems possible that the United States, despite labor shortage and other difficulties, will become the world's greatest exporter of wood products.

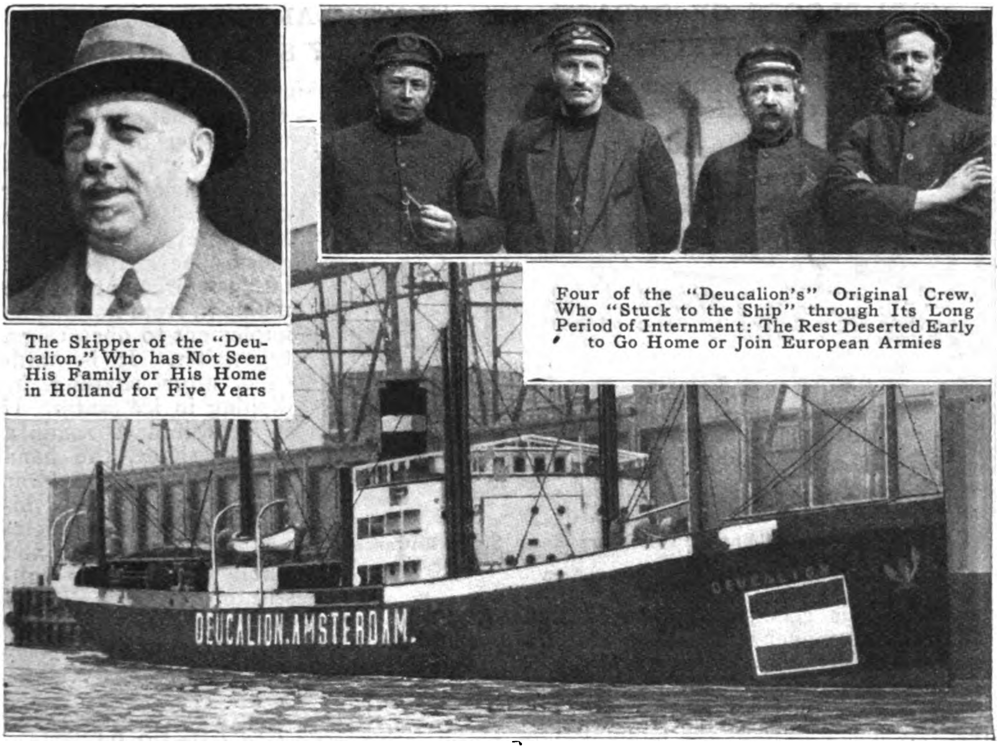
FIRE-BOX WALL FOR FURNACE HELPS TO BURN SOFT COAL

Last winter's experience with soft coal, burned in hard-coal furnaces, gave the final test to a number of ingenious devices designed to help in the emergency. One of the simplest of these was marketed in the form of a slab of refractory composition easily cut with a chisel and hammer, to fit across the furnace fire box like a wall, dividing it into two parts, except for a three-inch space just above the grate. When soft coal is fired alternately on one side and then the other of the wall, complete combustion is assured.



ALMOST FIVE-YEARS OVERDUE SHIP MAKES PORT AT LAST

Five years ago the Dutch steamship "Deucalion" packed a cargo of fruit at Smyrna, Turkey in Asia, and prepared to weigh anchor. Then the war broke. The port was closed. Even the doubtful privi-



The Skipper of the "Deucalion," Who has Not Seen His Family or His Home in Holland for Five Years

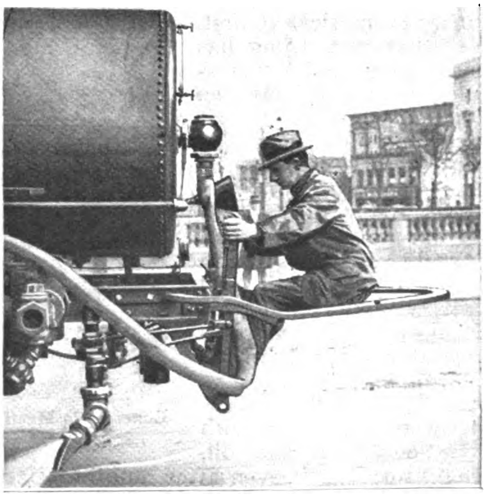
Four of the "Deucalion's" Original Crew, Who "Stuck to the Ship" through Its Long Period of Internment: The Rest Deserted Early to Go Home or Join European Armies

Dutch Steamship "Deucalion," Docked at Boston after Nearly Five Years' Internment at Smyrna, Turkey, Where Its Prow was Dented by a British Bomb Aimed at a German Ship Lying Alongside: The Vessel Was All Ready to Sail When War Broke Out

lege of running the blockade was refused, and the ship came to an enforced anchorage beside an interned German vessel. Here it was subjected to a secondhand bombardment by British fliers, who dented its prow while trying with partial success to sink the German. The perishable cargo was exchanged for one of tobacco, licorice root, and emery stones, as better suited to a long stay; but most of its crew deserted early. When finally the British occupied Smyrna and gave the vessel the first clearance papers issued; a pick-up crew took it to Mediterranean ports, where experienced sailors were secured. The run to Boston was made in 79 days.

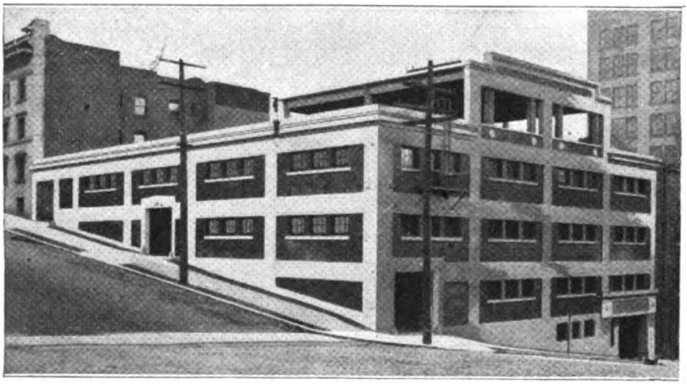
SPEAKING TUBE AND SHIELD FOR STREET-FLUSHER MAN

On the motor street flushers used in San Francisco, the operator sits at the back, and communicates with the driver through a speaking tube, mounted on the truck frame and ending in funnel-shaped mouthpieces at front and rear. To keep him from being bumped by other vehicles, a heavy iron fender, rigidly bolted to the frame, completely encircles him. This enables him to keep his mind off the hazards of his location and to concentrate on his work.



The Semicircular Fender of Heavy Iron, at the Rear of This Street-Flushing Truck, Protects the Operator from Other Vehicles. The Funnel Is a Speaking-Tube Mouthpiece, for Communicating with the Driver.

FOUR FLOORS OF GARAGE OPEN ON STREET



Each One of This Building's Four Floors Has a Street Entrance of Its Own. With a Little Excavation All Floors were Given the Same Area

By providing a street entrance for each floor the owner of a four-story garage quadruples his accessible storage space. This unusual convenience was made possible by locating the building at the intersection of two sharply sloping streets, and excavating to give all floors the same area. By using all exits the building may be quickly emptied of 250 cars.

COAL DUST MIXED WITH OIL MAKES NEW LIQUID FUEL

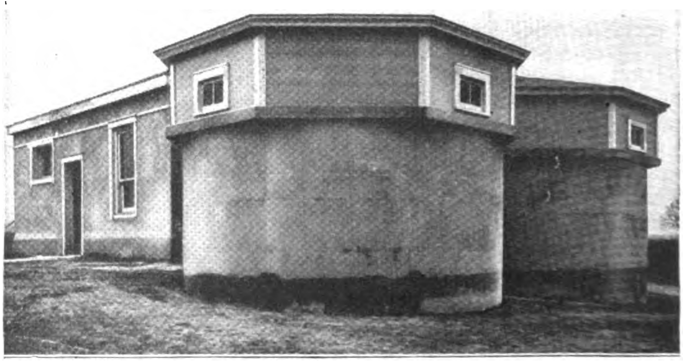
Liquids and solids do not ordinarily mix, and the idea of combining coal and petroleum to make a new fuel sounds rather chimerical at first. Yet that very thing has been done, and successfully, by pulverizing the coal so finely that it forms a colloidal, or suspended, mixture with the oil. This compound passes freely through all regular oil pipes and burners, so that it can be used for power and heat without equipment change; and it generates a greater heat value than oil alone. Coal dust, passed through a 200-mesh screen, mixed with a little tar in the oil, leaves no deposit even after months. Use of the new fuel in place of fuel oil on sea and land would save millions of barrels of oil a year.

PLASTIC ARTIFICIAL HANDS QUICKLY SHAPED FOR USE

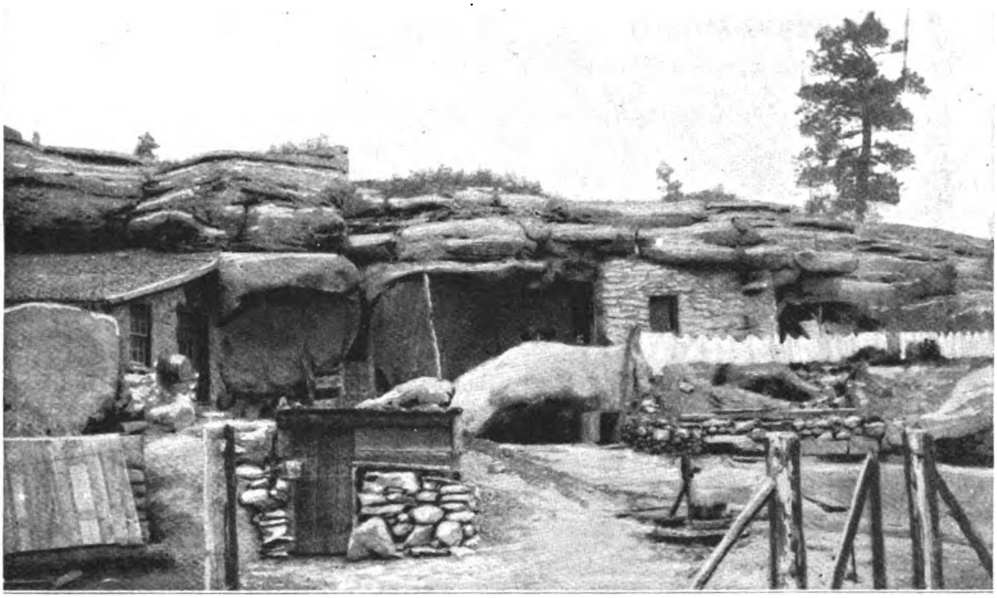
Gelatin combined with dentists' modeling compound is the material out of which a surgeon of Washington, D. C., fashions plastic artificial hands for cripples. By softening in hot water, the hand can quickly be shaped to fit any requirement of the moment, from holding an implement to operating a typewriter. It is hardened after shaping by dipping in ice water. If it is desired to retain a certain shape, the hand may be removed and one differently shaped installed. The plastic member is a simple and wholly satisfactory substitute for complicated artificial hands with articulated joints which are mechanically adjusted for each requirement.

CONCRETE REPLACES STEEL IN SOFTENING TANKS

The concrete-silo contractor can erect water-softening tanks of this sort with but very little change in his equipment. The tanks pictured are part of a system that is supplying soft water at the rate of 4,000 gal. per hour, two tanks being used so that one may be drained of its softened water while the proper chemicals are being stirred into the other. Tanks of this kind are recommended by their permanency rather than their initial cost.



Concrete is Meeting with Some Favor as Material for Water-Softening Tanks. Two Are Necessary in the Type of Plant Pictured



Montana Coal Miners have Built Themselves These Fireproof Homes by Erecting a Wall beneath the Projecting-Rim Rock. These Modern Cliff Dwellings Are Quite Common in Certain Parts of Europe, Where Whole Communities Live in This Way

MONTANA MINERS BUILD HOMES IN ANCIENT STYLE

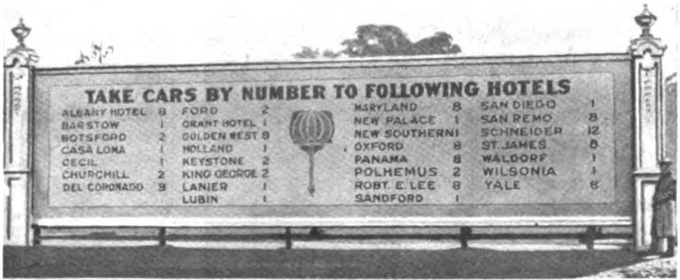
A characteristic bit of the Old World may be seen near Roundup, Mont., where Austrian and Italian miners have built their homes in ancient fashion, under a projecting-rim rock. By simply erecting a stone wall, they have a shelter that cannot be bettered for warmth in winter and coolness in summer.

SINGLE ELECTRICAL CONTROL ON TWO-LOCOMOTIVE TRAIN

When a railroad train has a locomotive at both front and rear, the forward driver can control both with an electrical arrangement devised for use on a French system. No train cable is needed, the power rail, or wire, in the case of electric railways, being used to transmit the control impulses. High-frequency currents at low voltage are generated in the front locomotive and picked up by selective apparatus in the rear locomotive, where they are made to operate the control mechanism. Varying the current frequency enables it to perform different functions.

ADVERTISING DEVICE GUIDES TRAVELER TO HOTEL

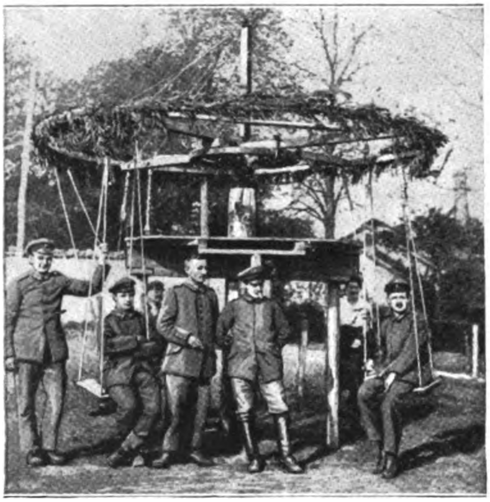
Tourists, hotels, and advertisers are all expressing satisfaction with a monster hotel directory fronting the street-car tracks at a large railroad station. The brevity of the instructions given is explained by the numbering of all cars and car routes throughout the city. Thus, to reach the hotel of his choice, the stranger simply boards the first car bearing the number opposite the name of his hotel.



A Glance Tells the Stranger in This Town What Car will Take Him to His Hotel. The Numbers Correspond to the City's Various Street-Car Routes

AMERICANS CAPTURE GERMAN MERRY-GO-ROUND

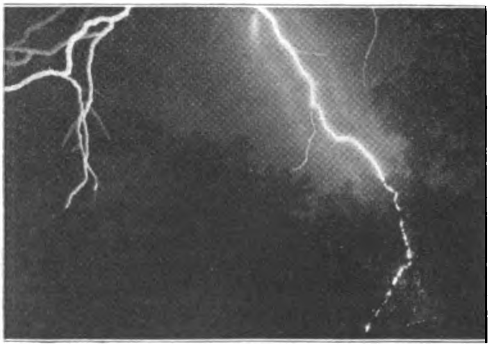
When the Second American Army took Stenay, about 25 miles north of Verdun, on Nov. 10, 1918, they found among the spoils of war a crudely built merry-go-round. From the photograph, which was found in a hut near by, it is evident that the German soldiers' actually relieved the monotony of trench warfare in this way.



Advancing Americans Found This Merry-Go-Round at Stenay, France, the Day before the Armistice

CATCHES LIGHTNING IN PHOTO AT PAINFULLY CLOSE RANGE

Night pictures of lightning are readily obtained by leaving the camera lens open until a strong flash occurs, but amateurs are seldom lucky in catching a good impression. A photographer at Waterloo, Ia., engaged in this pastime, was startled by the crash of a bolt which struck about a block from him. The camera faithfully recorded the image, and the result was worth a scare.



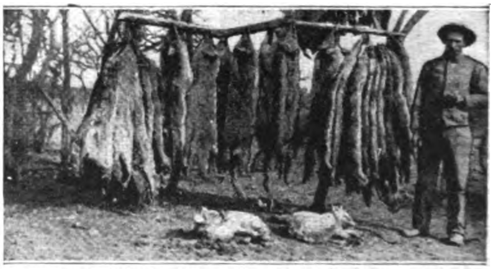
Unusual Photograph of Lightning Flash: The Ramifications of the Near Branch and the Halation Effect of the Distant One Are Particularly Noteworthy

ONE-PIECE CONCRETE WALLS WITH DEAD-AIR CHAMBER

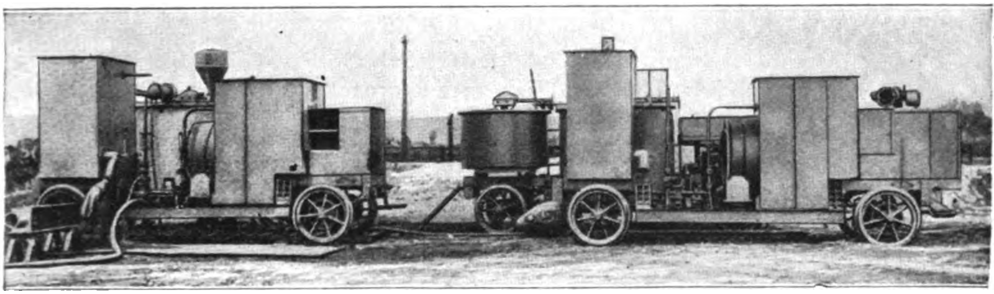
House walls of one-piece concrete containing a central dead-air space are constructed by an English engineer with a simple arrangement. The core for the air chamber is fixed, while the mold is moved upward as sections of the wall are completed. An alternative method is to fix the mold and move the core. The chamber may be the full size of the wall, but stronger construction results by forming concrete bonds in which are placed the iron ties. A wall nine inches thick would usually have a two-inch air space. Such walls are quite dry, and much stronger and cheaper than common brick.

POISON PELLET LESSENING COYOTE NUISANCE

A wolf causes an estimated annual loss to western stockmen of $1,000; a bobcat, or coyote, of $50. Colorado and several other states reckon their annual losses from this source at more than a million dollars. Figures of this sort showed the Federal government that the evil was worth its attention. So the problem was referred to the Biological Survey, which perfected a poisoned ground-meat pellet that is far more effective than the trap or gun. Assigning men of its poison squad to definite territories, where the animals are lured by attractive bait, the government now reports that dead wolves, bobcats, and coyotes are being found in every corner of the range country. Although the animals wander far from the poison before dying, enough pelts are recovered and marketed each year to reduce the cost of killing to $10 a head.



By Marketing the Pelts of Coyotes the Government Is Able to Reduce the Cost of Killing Them



The Army Balloon Service has Mounted This Two-Unit Gas Plant on Wheels, So That It may be Towed by Motor Truck Wherever Hydrogen Gas is Needed

PORTABLE GAS PLANTS FOLLOW ARMY BALLOONS

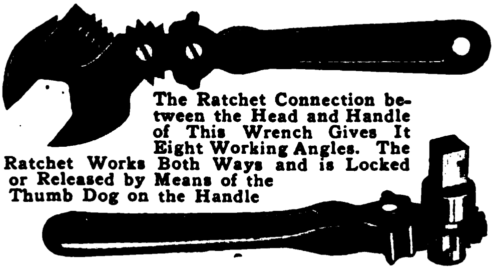
By the construction of portable gas-producing plants the army balloon service has greatly increased the efficiency and mobility of its organization. Under war conditions hydrogen gas was formerly conveyed from producing plant to the front in heavy steel cylinders, each holding, under high pressure, about 2,000 cu. ft. But the capacity of a captive balloon is often 50,000 cu. ft. or more, making the transportation problem a serious one. The new machine, however, may be towed by motor truck directly to the scene of operations, where it will produce gas fully as good as that from a permanent plant.

TRAVELING EXHIBIT TEACHES FOREST PROTECTION

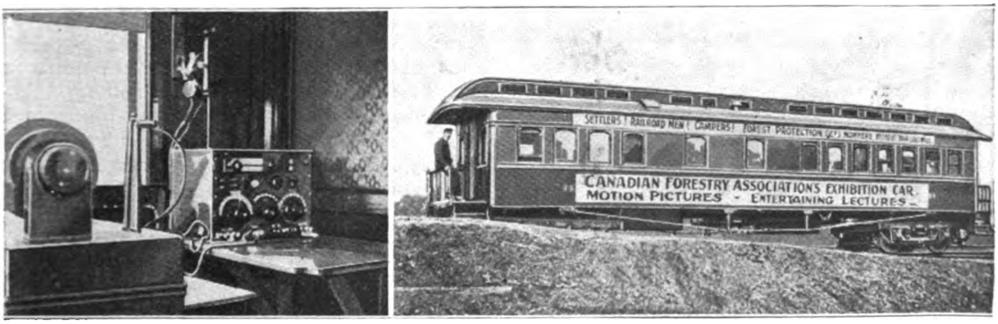
The tremendous importance of timber conservation is being taught to farmers, railroad men, and lumberjacks of northern Canada by various educational campaigns. A feature of the work is the railway coach which travels wherever rails are laid, with a display of wireless outfits, miniature lookout towers, and airplanes, and a score of similar exhibits. The car also carries a lecturer who conducts visitors through the car in the daytime, and at night gives illustrated lectures in some local hall.

MONKEY WRENCH WORKS AT SEVERAL ANGLES

It often happens that some obstruction prevents the turning of a monkey wrench though the jaws fit the nut. A novel form of adjustable wrench has its head pivoted in the handle, with a ratchet connection. This not only allows the tool to be used at eight different angles, but makes effective even a very limited movement of the handle. The ratchet, which works either way, is locked or released by pressing on a small dog located where the user's thumb naturally rests.



The Ratchet Connection between the Head and Handle of This Wrench Gives It Eight Working Angles. The Ratchet Works Both Ways and is Locked or Released by Means of the Thumb Dog on the Handle



SETTLERS! RAILROAD MEN! CAMPERS! FOREST PROTECTION
CANADIAN FORESTRY ASSOCIATIONS EXHIBITION CAR
MOTION PICTURES - ENTERTAINING LECTURES

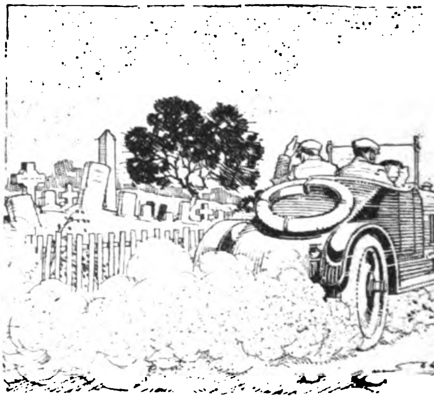
This Railway Coach has Covered Four of Canada's Great Northern Provinces Preaching Coöperation against Forest Fires. On the Left Is the Wireless Outfit Which is Carried

THE FIRST FLIGHT

By SEARLE HENDEE

ONE'S first flight is much like one's first operation. He learns it is to be, and awakes to find it has been. Also he follows instructions with lamblike obedience. When things get in full swing—that is, when it is time for the ether and too late to back out—he thinks of his sins.

Not long ago I was closeted with the president of a well-known aircraft corporation. Suddenly he asked if I had ever been up. I thought of two late friends, both of whom met tragic ends shortly after offering to take me aloft, and as shortly before doing so, and replied negatively.



"The field was six miles distant by map, but not so by motor car. . . . A moment later, atop a partly bald knoll, we approached a quaint little graveyard. A cemetery . . . holds a certain fascination for some folks."

The president looked at his watch. It was four o'clock.

"I'll send you up this afternoon," he said, turning to his telephone. "Step downstairs and hear from me presently."

I did as bidden, and less than three minutes later, by the clock, two gentlemen approached briskly.

"The second guard passed me to an office boy on roller skates. The boy was a speedy convoy. In less time than it takes to tell it, I was signing my name to a pink tag . . . for the convenience of the coroner, no doubt."

"This is Mr. Smith," said one of them. "He will drive you to the field. You will see Mr. Mackley. You will go up with Mr. Wehlan. Hope you have a pleasant flight. Good luck."

Things were moving. Anyway Mr. Smith was disappearing through a doorway. I caught up with him just in time to jump into a snorty roadster before it leaped ahead like a bronco spurred in the flanks by a drunken cow puncher.

The field was six miles distant by map, but not so by motor car. At least it was reached in scarcely that many minutes.

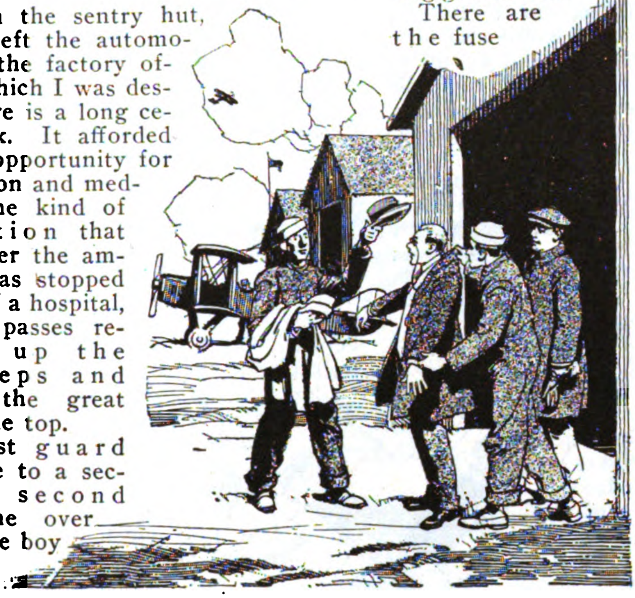
But in six minutes of rapid driving—or in what seems to be only six minutes—many things may attract one's attention. First, for instance, there was the wreck of an automobile draped about a telephone pole. Then there was an all-glass schoolhouse attended by boys who refuse to have summer vacations. The one suggested a grim thought, and the other seemed too fantastic really to be of this world.

The drone of a motor overhead was audible. Several thousand feet aloft an aeroplane, apparently gone crazy, was turning one somersault after another in dizzy succession.

A moment later, atop a partly bald knoll, we approached a quaint little graveyard. A cemetery that has the appearance of age—and this one had—holds a certain fascination for some folks. Old-fashioned slabs, cracked, crumbled, and askew, with weather-beaten epitaphs and homely American names, hold interest for one who finds enjoyment in browsing around picturesque spots.

At least the place seemed interesting, as I looked again at the sky-larking plane in the distance and my companion remarked, "That's probably Wehlan now. Flies like him anyway." All of which was interesting to know.

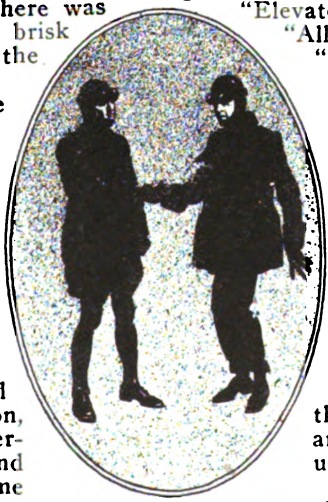
We reached the field. Mr. Smith remarked in parting: "You are fortunate to go up with Wehlan," whatever that meant.



" 'Is this the man?' one of them called. Apparently 'this' was, for . . . one man pulled off my overcoat and another momentarily blindfolded me with a knitted helmet, then a leather one, and lastly goggles."

Between the sentry hut, where I left the automobile, and the factory office, for which I was destined, there is a long cement walk. It afforded the only opportunity for slow motion and meditation—the kind of meditation that comes after the ambulance has stopped in front of a hospital, and one passes reluctantly up the stone steps and through the great door at the top.

The first guard passed me to a second, the second turned me over to an office boy on roller skates. The office boy was a speedy convoy. In less than it takes to tell it, I was signing my name to a pink tag and a white card—a mere formality, but for the convenience of the coroner, no doubt. Then there was another walk—this time a brisk one under escort—through the factory.



"The pilot stepped forward with hand extended. It was much like getting into a prize ring and shaking gloves with Jess Willard."

As we emerged from the doorway of a vacant hangar and stepped into the field, a yellow De Haviland plane, a few yards ahead, faced us. About it were grouped several men. Two of them, in the one-piece khaki togs of helpers, ran forward.

"Is this the man?" one of them called. Apparently "this" was, for while I turned to my escort for verification, one man pulled off my overcoat and hat, while the second momentarily blindfolded me with a knitted helmet, then a leather one, and lastly a pair of goggles. While the latter were being adjusted, a warmly lined leather coat was hung in place and buttoned tightly.

The pilot stepped forward with hand extended. It was much like getting into a prize ring by accident and shaking gloves with Jess Willard. There are two toe holes in the fuselage of a De Haviland that afford access from the ground. They were used, and presently, ensconced in the heavily upholstered rear seat, I was securely strapped in place.

The instrument board, with its eight or nine dials, was before me. Likewise there were the "joy stick" and foot bar, for the machine had dual control. Forward, atop the fuselage, was a small, transparent cowl.

The onlookers scattered. The pilot swung into his place ahead, and in a moment the stick and foot bar began moving.

"Ailerons," said the pilot.

"All right," came the reply from the ground.

"Elevator."

"All right."

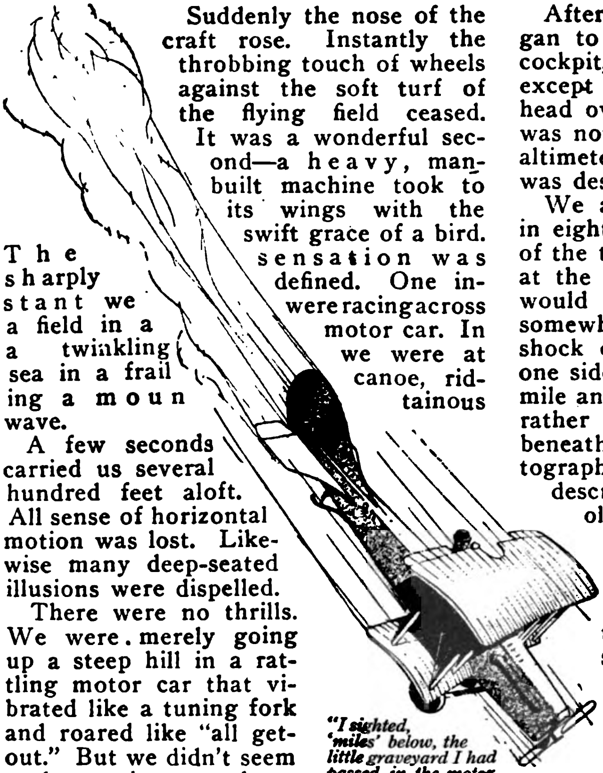
"Rudder."

"All right."

"Turn her over."

With that the big 12-cylinder Liberty motor gave a snort that grew into a roaring purr. Gasoline perfumed the air that rushed rearward in powerful currents. In a moment, the motor warmed, the pilot began to open the throttle wider. The right wing was released and the tip of the left one held back, causing the plane to swing at right angles to the hangar as it got under way.

We were off. The roar of the engine grew intense. The plane trembled. The ground, covered with dead turf, looked like yellow matting as the machine swept across it, gaining speed each inch it traveled.



"I sighted, 'miles' below, the little graveyard I had passed in the motor car. . . . The pilot suddenly pointed the nose of the ship straight down. . . . Down we shot, straight as a plumb line. . . . Up came the cemetery to meet us half-way."

Suddenly the nose of the craft rose. Instantly the throbbing touch of wheels against the soft turf of the flying field ceased. It was a wonderful second—a heavy, man-built machine took to its wings with the swift grace of a bird. The sensation was sharply defined. One instant we were racing across a field in a motor car. In a twinkling we were at sea in a frail canoe, riding a mountainous wave.

A few seconds carried us several hundred feet aloft. All sense of horizontal motion was lost. Likewise many deep-seated illusions were dispelled.

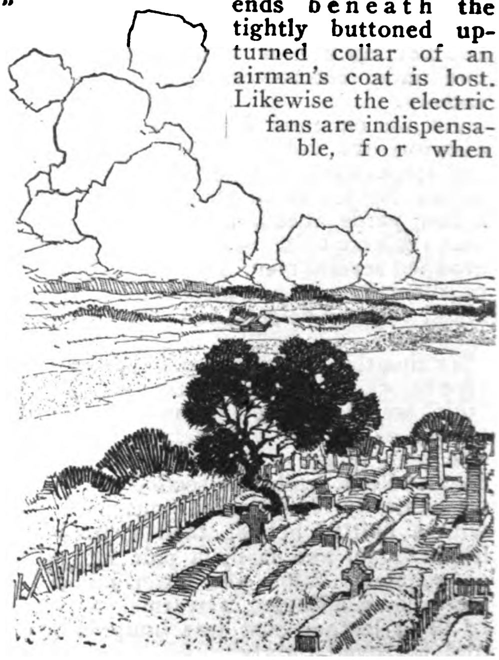
There were no thrills. We were merely going up a steep hill in a rattling motor car that vibrated like a tuning fork and roared like "all get-out." But we didn't seem to be getting anywhere. There was no sense of motion, except that of continual turning and corklike bobbing as the craft climbed. Those who shun motor cars because they fear speed, should take up aviation. To travel a hundred miles an hour in the air is no more exciting than sitting in a rocking chair in a machine shop.

I had expected a certain buoyant exhilaration. I had it all settled in my mind that I would feel decidedly birdlike and skim through the air as if swimming in space. And "swimming in space," I half feared, might have the disastrous effect that always obtains when I cross Lake Michigan in a "terrible storm." Also I harked back to boyhood days and recalled the time I scaled a telephone pole on a bet, looked down at the ground, and all but fainted.

Flying doesn't make one think he has wings. Neither does it make him seasick, nor scare him to death by taking him to "dizzy" heights. In fact, straight flying is as nearly devoid of unusual sensations as anything possibly could be. It even lacks the thrills that make children relish swinging on a rope—and other "first-flighters" agree with me in this.

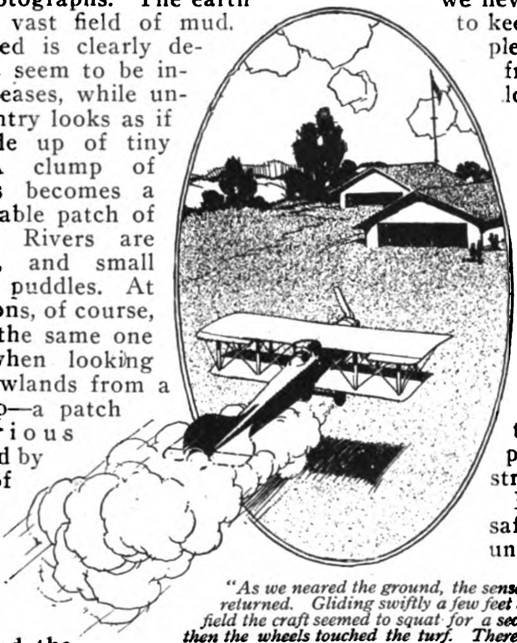
After a few minutes of climbing, I began to be bored. Strapped in the rear cockpit, unable even to see the pilot ahead except on occasions when he thrust his head over the side of the fuselage, there was nothing to do except look up at the altimeter or down at the earth. Variety was desirable, so I did both.

We attained an elevation of 8,500 ft. in eight or nine minutes of flight. Most of the time was spent in looking sidewise at the horizon and wondering when we would begin to fly horizontally and get somewhere. Therefore it was with a shock of surprise that, upon leaning to one side and looking straight down for a mile and a half, I discovered a large city, rather than open country, immediately beneath us. In these days of aerial photography, it hardly behooves a writer to describe the chimney pots of a metropolis, or the appearance of the earth itself, as seen from a vantage point. Bandage your neck until it is immovable, climb on top of a piano, allow 100 electric fans to blow in your face, squint at a relief map on the floor, and you obtain a fair representation of what one sees and how one feels when looking down from far aloft. It is necessary to bind the neck, else the effect of wearing two helmets with ends beneath the tightly buttoned upturned collar of an airman's coat is lost. Likewise the electric fans are indispensable, for when



one's head is not directly protected by the cowl, the rush of air pulls his hair—helmets notwithstanding—and plays havoc with his eyelids, despite goggles.

In wintertime, however, open country from the sky has an appearance that is missed in photographs. The earth looks like a vast field of mud. The watershed is clearly defined. Bluffs seem to be insignificant creases, while undulating country looks as if it were made up of tiny mounds. A clump of leafless trees becomes a barely noticeable patch of low brush. Rivers are mere seams, and small lakes shallow puddles. At lower elevations, of course, the scene is the same one obtains when looking across the lowlands from a mountain top—a patch quilt of various shades seamed by a jumble of threadlike highways, crossing at all angles.



"As we neared the ground, the sense of speed returned. Gliding swiftly a few feet above the field the craft seemed to squat for a second, and then the wheels touched the turf. There was one soft bounce, and we rolled toward the hangar and into it."

For years past, many have conceived the so-called millennium as a future time when aeroplanes would be as common as motor cars, and fliers would land on housetops and in streets and country roads. Already successful landings have been made in city thoroughfares and rural highways, and one descent has been made on the roof of a business building. But to the landlubber who goes aloft for the first time, reaches a height of a mile and a half, and looks down, such "pocket-handkerchief" landings seem absolutely impossible of accomplishment, for the roof of a large building appears no greater in area than one's thumb nail, and a street or a road looks no wider than a crack in a hardwood floor. Miraculous marksmanship would be required, the novice thinks, to bring a plane anywhere near such places—in fact no specified spot smaller than the Sahara Desert itself could be hit except by the rarest of accidents. In other words, the smallness of everything as viewed from a distance, produces a marked impression, when the thought of landing is considered. The tyro, however, fails to realize that a pilot doesn't actually begin to land until his machine is within 200 ft., or so, of the ground, from which height normal vision is afforded.

All of these things flashed through my mind as we sailed along, high above field and streams, housetops and city streets. Unfamiliarity with the district over which we flew made it impossible for me to keep my bearings. I was completely bewildered. The field from which we ascended was lost in the maze of other fields a minute after we left the ground.

It was like riding in a train and suddenly coming in view of one's home town after years of absence, therefore, when I sighted, "miles" below, the little graveyard that I had previously passed in the motor car. As I gazed upon it, fascinated for some queer reason, the pilot suddenly throttled the engine and pointed the nose of the ship straight down.

Instantly I wondered if the safety strap could have come unbuckled. Down we shot, as straight as a plumb line, and fully as fast as Mr. Newton's law of gravity could pull us. Up came the cemetery to meet us halfway.

The first split second produced a "sort of sensation." The change in direction had not been anticipated. Furthermore, I wasn't exactly sitting on anything except my face. I wanted to take hold of something. I didn't want the plane to leave me behind. And yet I couldn't shift my eyes from the cemetery long enough to look for a handhold, and I feared that in feeling for one I might grab the "joy stick," so I gave it up and watched the tombstones travel skyward.

Down we went for 2,500 ft.—as I afterward learned—in an intoxicating dive. At last flying, more literally falling, was exhilarating. All was dead quiet, except for the rush of the air, and there was no vibration. This was "swimming in space!"

Suddenly the silence was broken. The motor burst into a roar. The "joy stick" was centered, ending our fall. The plane curved sharply, mounting as if to loop. The engine was throttled, as, nose up and half on its back, the craft was thrown on its side by a quick kick of the rudder. Again the motor roared, and down we dipped, reaching the normal line of flight on an even keel at full speed. All of this happened in a second. It produced seven distinct stomach motions. The pilot had done the "Immelman turn," known to French fliers as "reversement," a "stunt" much used in battle, but not necessarily done as the aftermath of a nose dive. I was revising my opinions of flying—after all it was not without thrills.

Traveling full speed ahead, the ship suddenly shot upward and began to stall. Then it whirled with a spiral motion, turned over on its back, slid on one wing, and plunged down, straightening out at length, and resuming its original direction. I wasn't quite sure what we had done, but I guessed it was a "vrille," and correctly, chiefly because it had made me feel like a human whirligig. After the long dive and the Immelman turn, however, I was, in a sense at least, prepared to enjoy this, and the subsequent flip-flops.

Finally, from an altitude of perhaps 3,000 ft., the machine began to descend in a steep spiral. Then, straightening out, banking two or three times between short glides, the craft approached the landing field at a height of perhaps 200 feet.

As we neared the ground, the sense of speed returned. Gliding swiftly a few feet above the field with motor throttled, the craft seemed to squat for a second, and then the wheels touched the turf. There was one soft bounce, and we rolled toward the hangar and into it.

The pilot climbed to his feet.

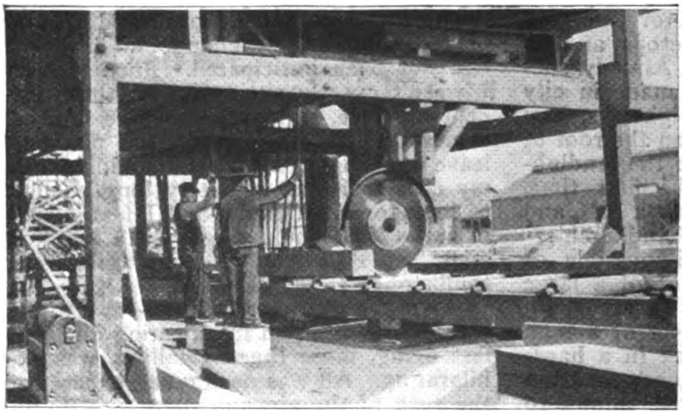
"How far did we drop in that nose dive?" I asked.

He replied, but I merely saw his lips move. Taking off goggles and headgear, I discovered my ears were ringing as if filled with water. They continued to do so for an hour.

The drive back to the city was very ordinary. I didn't even notice the cemetery.

BIG-TIMBER SAW ON ROLLERS CUTS AT ALL ANGLES

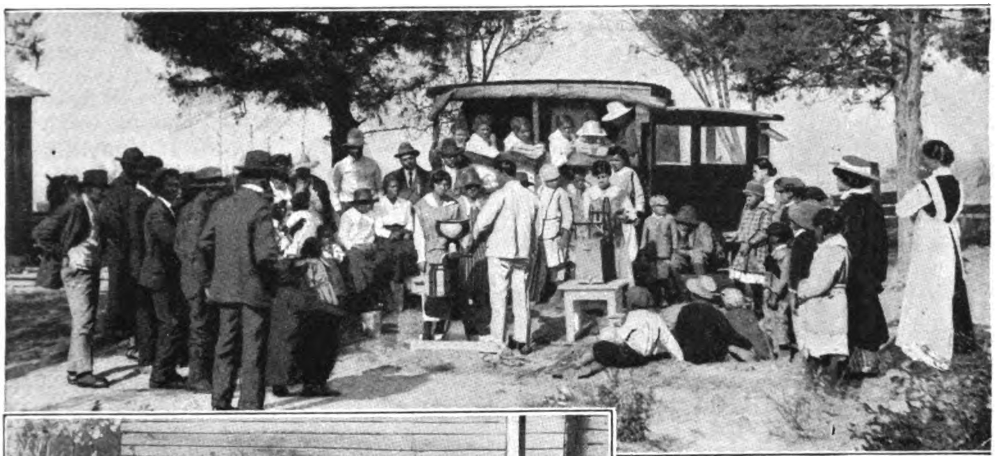
A big circular saw suspended from a rolling platform, instead of swung like a pendulum, is an improvement devised by a western shipyard foreman. The platform acts also as a turntable, allowing a cut at any angle. A lining edge tells the workman when the saw angle matches the cutting mark on the timber, the carriage being turned with a handwheel. Using a 16-ft. track and a 48-in. saw, timbers from 19 in. to 7½ ft. wide are cut straight through, leaving cleaner edges than the old swinging cut. The one saw keeps two tables busy, the carriage being rolled from one to the other. In an eight-hour day two men can cut 50,000 ft. of ship timber.

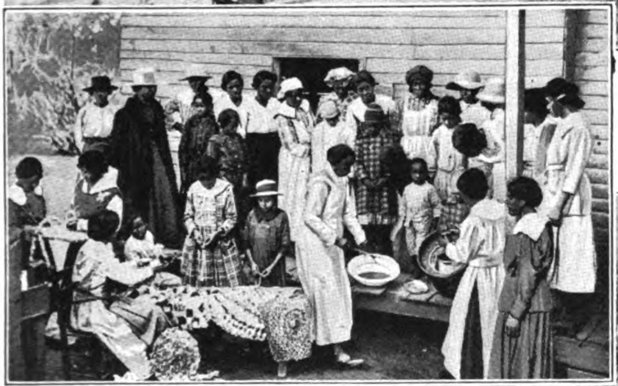


Shipyard Circular Saw Hung from a Rolling Platform Instead of a Swinging Arm, Thereby Making a Straight Cut of Great Length and Uniform Depth: The Carriage Also Turns to Cut at Any Angle

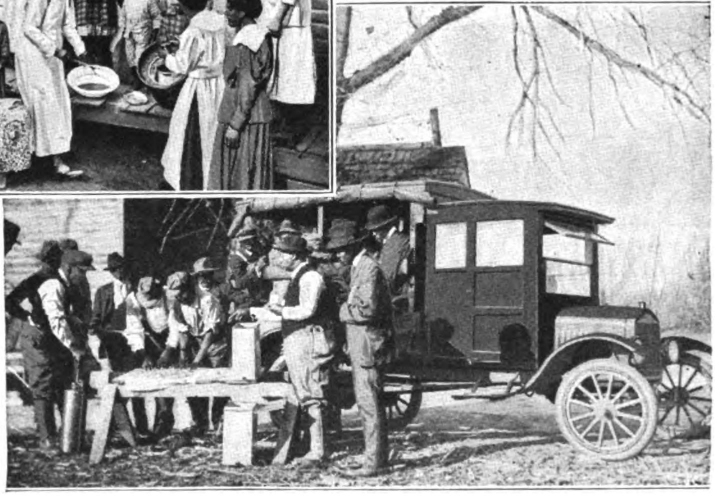
ASTRONOMER ADVOCATES ONE TIME FOR UNITED STATES

As a remedy for the complexity of the present system, an astronomer now proposes that there be but one time for the entire United States. He calls childish the assumption that people are slaves to their clocks; he suggests instead that they rise early or late despite the time shown by their timepieces. In detail, he would have all the clocks in the United States show the same hour, regulating the time of legal noon, however, by solar time. Thus, in the East, legal noon would fall at 10:30 a. m., and business would begin an hour and a half earlier than at present; in the far West it would fall at 2:00 p. m., and so on. A transcontinental traveler would never alter his watch; he would simply learn at what time local business commences. The same scientist also advocates numbering the hours of the day continuously from midnight to midnight, abolishing the present system entirely.





The Traveling School for Negroes is Seen Above, Holding Its Class in Cream Separating and Butter Making. Men and Women are Equally Interested in This Subject, and All the Demonstrators in the Truck Take a Hand



How to Make a Fireless Cooker Out of a Lard Tub, and the Proper Way to Weave Rag Rugs and Shuck Mats, Are the Absorbing Topics Presented to the Exclusive Class of Women in the Picture Above. The Men's Class, on the Right, is Learning How to Treat Oats for Smut. Later They will be Told How to Spray Peach Trees, Build Fences, Take Care of Live Stock, and Use Concrete. The Demonstrators, Also Colored, Wear Farmers' Working Clothes

FARM SCHOOL IN MOTOR TRUCK VISITS NEGRO DISTRICTS

Five men who know their subject can pack a surprisingly large amount of instructional material into a small motor truck. In Alabama, such a truck is engaged in the work of teaching better farming methods to the negroes in hitherto inaccessible districts. Home economics for the women is taught simultaneously in the same manner. Everything, from insect extermination to concrete construction, and from making rugs to caring for children, is included. A state school and the Department of Agriculture are behind the undertaking.

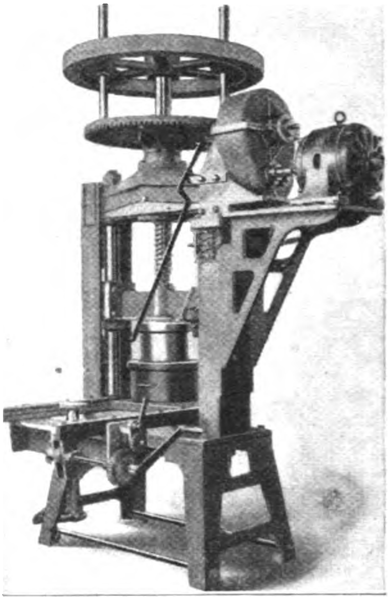
AIRPLANE LINE TO FAMOUS SWISS MOUNTAIN RESORT

Wealthy tourists to St. Moritz, the world-famous Swiss winter and summer resort, may soon be able to make the trip from Zurich in one hour, instead of the seven or eight now required by the railroad. Capitalized at about $100,000, a company has been formed to back the 90-mile airplane line, and has already announced that service will be inaugurated during the year with tickets selling at about $100. Many will doubtless be willing to pay this price, if for nothing but the matchless view of mountains, lakes, and glaciers.

ELECTRIC PRESS MAKES CLAY BOXES FOR POTTERS

Pottery ware which is to be subjected to kiln fire is placed in rough clay boxes, called "seggars." Ordinarily made by hand, these articles can now be turned out by an electrically driven press. which increases the capacity of a man and helper about tenfold. The operator places a piece of plastic clay in the mold, pushes it under the press, and moves the lever forward. The screw brings the top plunger down, and presses the seggar; after which the machine reverses itself and comes to a stop at the proper height. Pulling the mold back, the operator pushes out the seggar by means of the geared ejector. The helper carries the finished product to the drying room, from which it is delivered ready for use.

Two men could make by hand about 60 or 70 seggars, but it is claimed that with this machine the output may go as high as 1,000 a day. Much coarser materials may be used than with the hand presses.



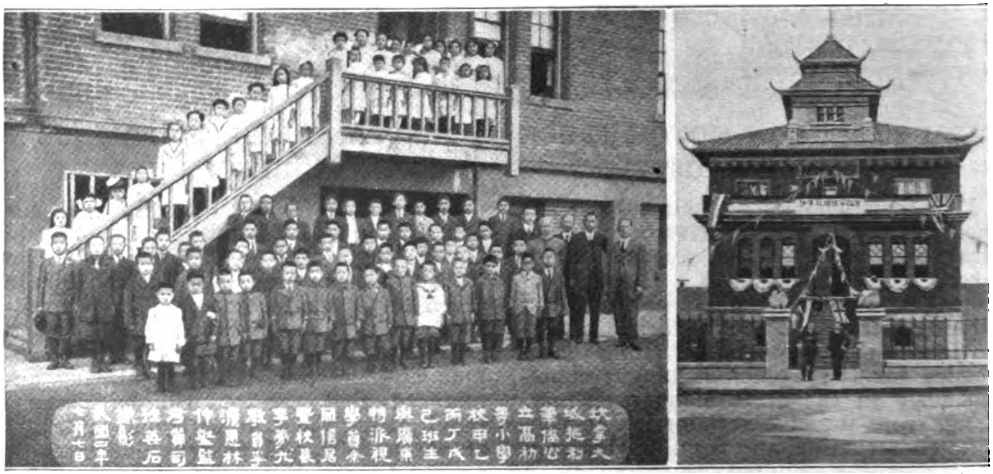
Clay Boxes, Known as "Seggars," are Fashioned by This Electric Press. It Is Simple in Operation and Free from Danger, Yet Increases the Operator's Efficiency by 1,000 Per Cent

GREAT STADIUM TO BE GIVEN TO FRENCH

On the completion of the interallied games in June, General Pershing will present to the French government the keys to "Pershing Stadium," built by the coöperative effort of the French and American armies and the Y. M. C. A. Situated not far from Paris, the stadium will hold 62,000 spectators within its concrete walls, besides the field itself, which has a 200-meter straightaway and a 500-meter elliptical track, inclosing the football field in the center.

CHINESE BUSINESS MEN SUPPORT SCHOOL

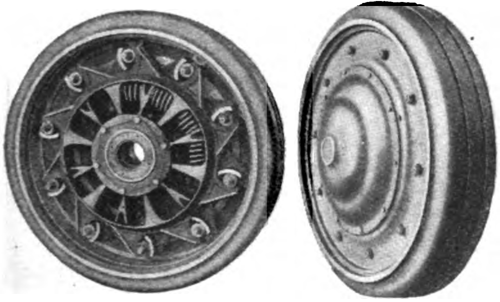
Chinese business men of Victoria, B. C., maintain a free school for children of their own race, which began with 40 pupils in 1899, and now boasts an enrollment of 200, instructed in both English and Chinese by a staff of six teachers. It is the desire of trustees and faculty that the children be trained, not only as



These Chinese-American School Children Attend a School of Their Own, and on the Occasion of the Photograph were Celebrating the Birth of the Sage Confucius. Standing before the School at the Right Are Two Pupils Who will Return to China to Complete Their Education worthy citizens of the Dominion in which they live, but also as pioneers who shall some day return to their native land to assist in its development. The work has had the endorsement of the last two Chinese ministers of education, as well as of the president of China, who lately presented the school with five hundred dollars.

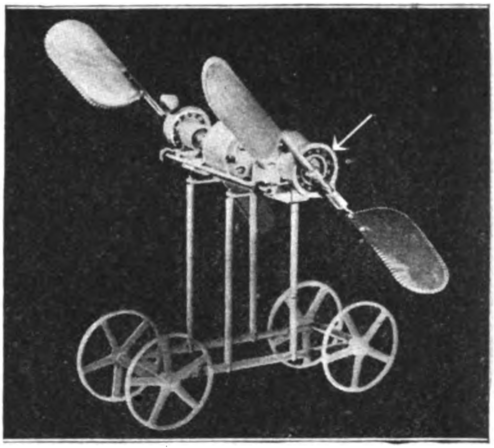
SPRING-FLOATED TRUCK WHEEL IS ADJUSTABLY RESILIENT

A resilient motor-truck wheel, containing 12 springs, which all work together instead of separately as when spring spokes are used, is the invention of an Ohio man. The rim has 10 inwardly projecting lugs, with a roller on each to reduce friction. Ten hook-shaped teeth on a floating spider push against the rollers in the forward-driving direction, and an exactly similar spider, reversed, engages them in the opposite direction. The 12 springs are arranged about the inner periphery of the hollow hub, compressed between spokes attached to the spiders and spokes fixed to the axle. When the wheel encounters a bump, the spiders tend to rotate in opposite directions against the springs, producing a uniform, resilient resistance. Breakage, or intentional removal, of some of the springs merely reduces the total spring tension and does not unbalance the resilient effect.


As Seen at the Left, Springs in This Resilient Wheel are Arranged Circularly Instead of Radially. The Complete Wheel is Shown in the Right-Hand View

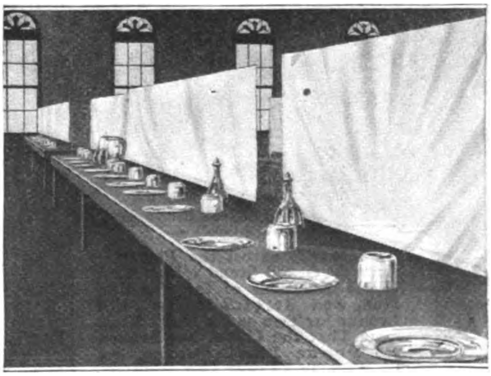
AIRSHIP MODEL EMPLOYS UNUSUAL PRINCIPLE

Great things are claimed for the finished machine by the inventor of the small model airship illustrated. In demonstration, he suspends it from a counterbalanced arm; switches current into the electric motor through a long wire; the propellers revolve and the machine rises. His secret is found in the collar which grasps the shaft of each propeller. Given an up-and-down motion by the eccentric ball bearing, which is indicated in the photograph by an arrow, the collar communicates a "feathering" motion to the propeller through the helical slots in the shaft. By altering the relative position of this eccentric he secures movement in any desired direction.

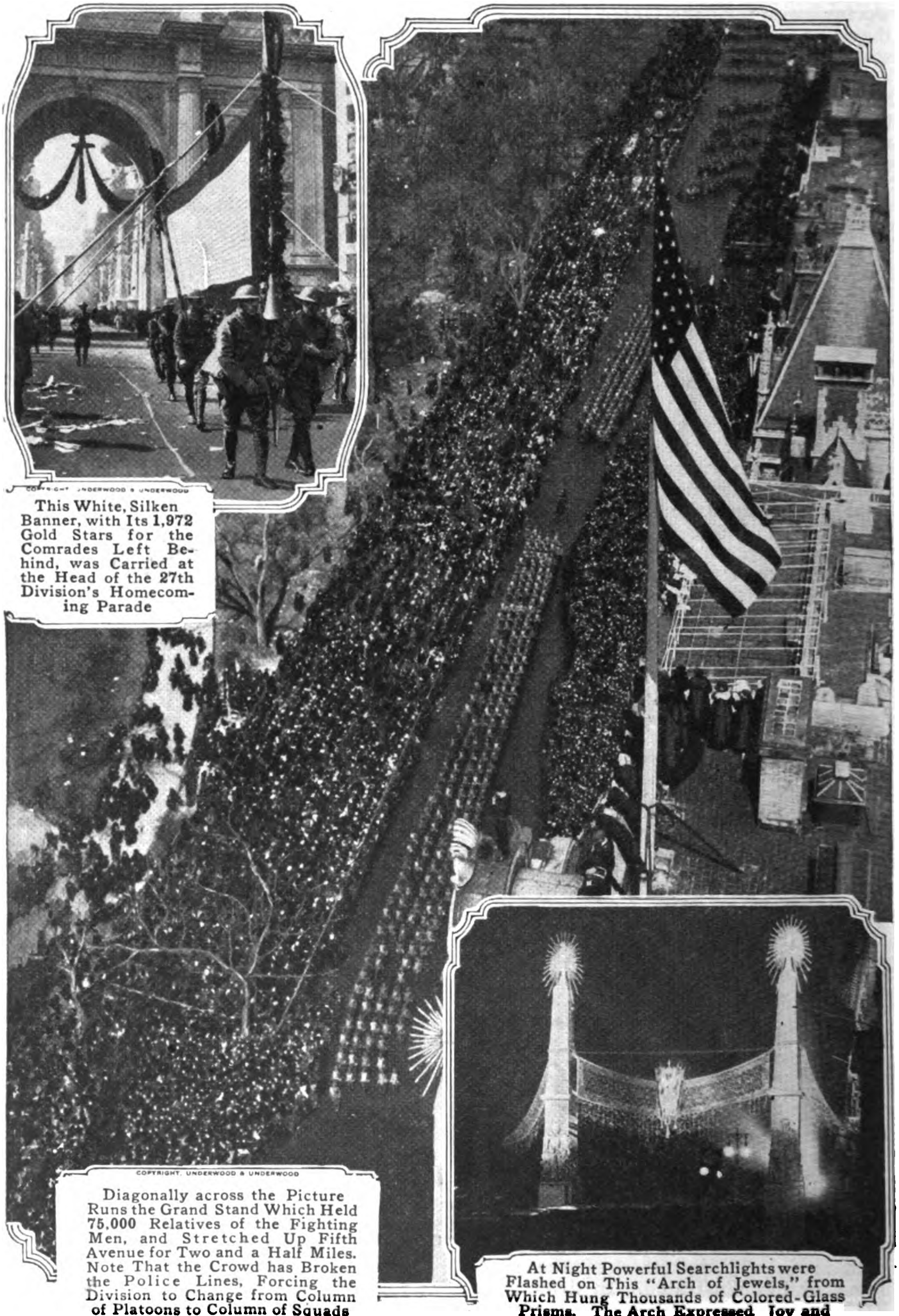

Swung from a Counterbalanced Arm This Air Machine Drives Itself in Any Desired Direction

HOW OILCLOTH HELPED FIGHT THE INFLUENZA

During the worst of the influenza trouble, upright strips of white oilcloth were stretched down the center of each long mess table at certain army posts. They made conversation across the table rather difficult, but everyone realized their worth in checking contagion.


These Long Strips of Glistening Oilcloth Minimized the Spread of Influenza in Army Mess Halls

NEW YORK'S MILLIONS GREET VETERAN OVERSEAS



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This White, Silken Banner, with Its 1,972 Gold Stars for the Comrades Left Behind, was Carried at the Head of the 27th Division's Homecoming Parade

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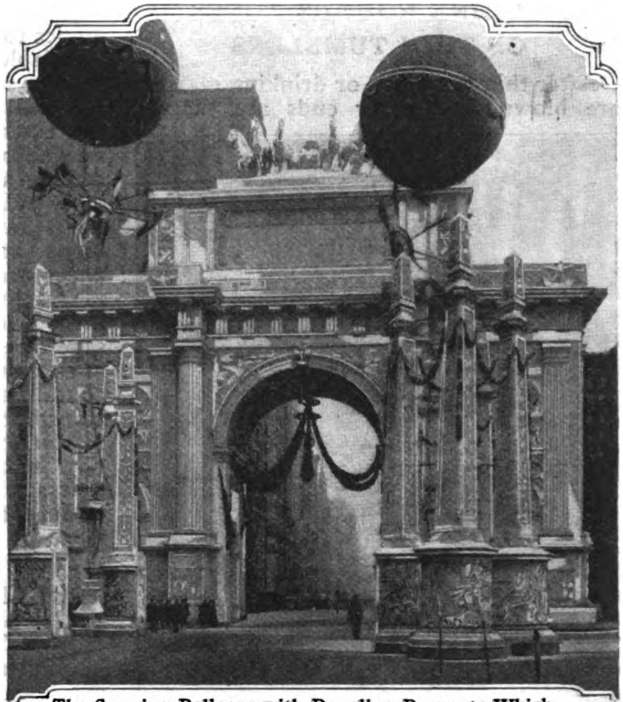
Diagonally across the Picture Runs the Grand Stand Which Held 75,000 Relatives of the Fighting Men, and Stretched Up Fifth Avenue for Two and a Half Miles. Note That the Crowd has Broken the Police Lines, Forcing the Division to Change from Column of Platoons to Column of Squads

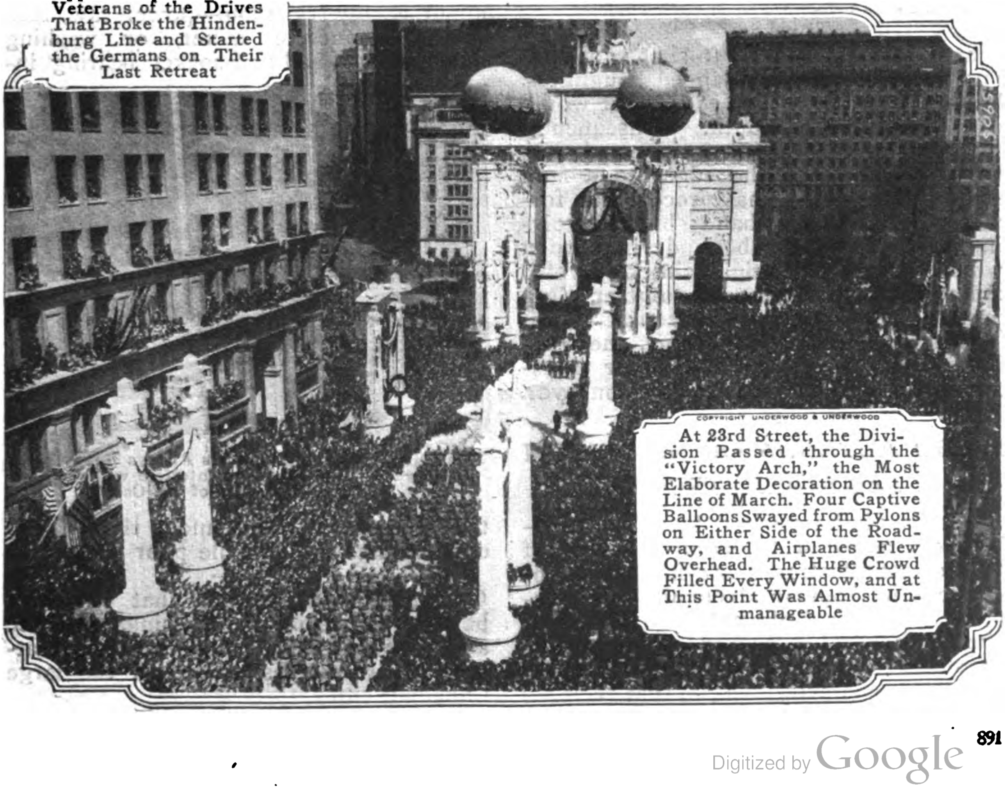
At Night Powerful Searchlights were Flashed on This "Arch of Jewels," from Which Hung Thousands of Colored-Glass Prisms. The Arch Expressed Joy and Thanksgiving

DIVISION IN GREATEST PARADE CITY EVER SAW

Even against This Fifth Avenue Church a Grand Stand was Built for the Spectators Who Applauded the 20,000 Veterans of the Drives That Broke the Hindenburg Line and Started the Germans on Their Last Retreat



The Swaying Balloons with Dangling Pennants Which Tugged at the Ribbons, Anchoring Them to the White Columns of the Victory Arch, Gave an Air of Dreamlike Unreality to the Scene. The Columns were Linked Together with Green Garlands



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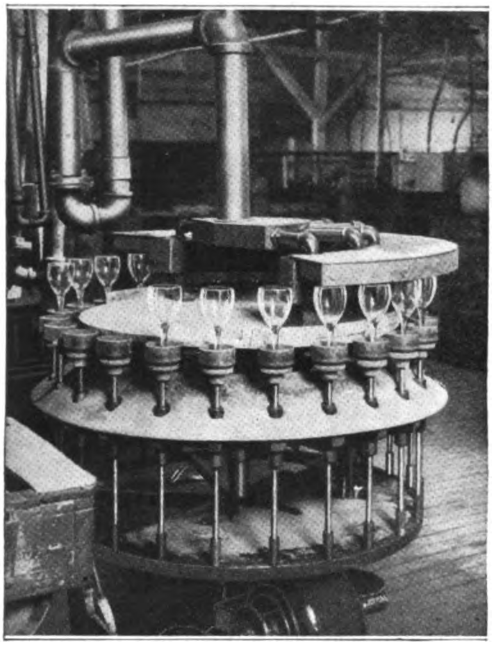
At 23rd Street, the Division Passed through the "Victory Arch," the Most Elaborate Decoration on the Line of March. Four Captive Balloons Swayed from Pylons on Either Side of the Roadway, and Airplanes Flew Overhead. The Huge Crowd Filled Every Window, and at This Point Was Almost Unmanageable

MACHINE ROUNDS EDGES OF THIN TUMBLERS

After thin tumblers, or drinking glasses, are blown, the upper ends are scored, heated, and cracked off to shape. Grinding then reduces any jagged roughness, leaving, however, sharp edges that would certainly cut the mouth. Consequently the tumbler tops are last subjected to a flame which melts the edges to a final smoothness. This final process has formerly been done by hand; but a revolving table has now been devised upon which a score of upright chucks revolve independently, carrying the tumbler edges past a semicircle of horizontal flame. Two girls operate the machine, one feeding it rough tumblers, the other transferring the finished articles to a conveyor.



The Machine Pictured Passes the Edges of Thin Tumblers before a Flame, Each Tumbler Revolving Separately

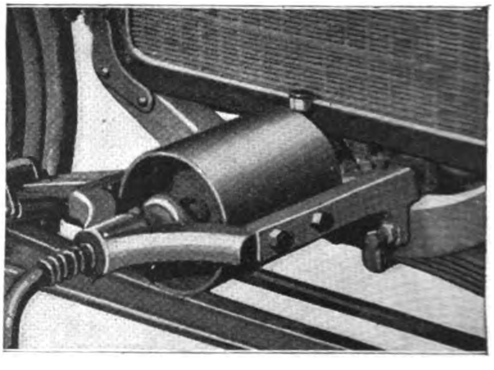
RADIO ANTENNA OF NEW FORM CURES STATIC TROUBLE

Details of the method by which wireless telegraphy or telephony is cured of its greatest affliction, static trouble, as announced in Popular Mechanics last February, are now made public. The atmospheric electrical disturbances responsible for static phenomena are found to possess distinctive characteristics, in that their vibrations are propagated in a plane at right angles to that of the radio-message waves. Available message waves reach the receiving station only in a horizontal plane. Natural variations of potential between the earth and higher atmospheric strata, on the other hand, pass through the receiving antennæ in a vertical direction.

By substituting for the usual tower of wires an alined pair of rectangular wire loops near the ground, the aerial disturbances are forced to affect both loops simultaneously. By differential operation these two charges are nullified. In message reception, however, the two loops are not electrically in phase, because the horizontal impulses reach the loop nearest the transmitting station first. It is a simple matter to combine and make use of these now unhampered waves. The result is that static is eliminated, a simpler form of antenna made effective, and a new element of directional selection introduced.

PULLEY CLAMPED TO MOTOR CAR HAS MANY USES

An attachment for a well-known small-priced car that should interest the farmer is a 6-in. drive pulley which clamps to the frame in front of the motor. Developing from 8 to 10 horsepower, it should run any of the light machines about a country home—power saw, feed grinder, concrete mixer, or washing machine. A ball-and-socket bearing introduced immediately under the oil cup compensates for possible poor alinement.



This Auxiliary Power Plant Is Always Ready When Needed, Yet does Not Interfere with the Driving Qualities of the Car

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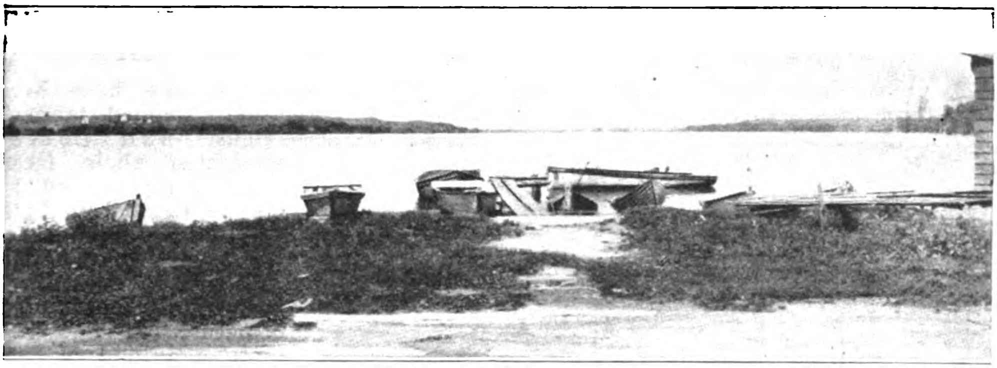
ℭChildren's playgrounds, that will serve both to emphasize the blessings of peace and to memorialize those who died to attain it, are suggested for all the large Canadian cities.



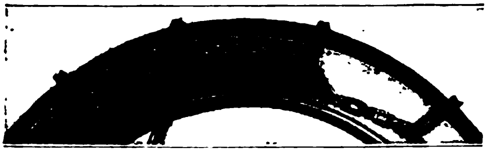
Lake of 200 Acres Formed by the Escaped Water of a Gushing Well on a North Dakota Farm: By Renting Rowboats to Duck Hunters and Other Pleasure Seekers, and Selling Shore Lots to City People, the Farmer is Making Bigger Profits Than He Ever Realized from the Crops Which were Drowned by the Runaway Well

RUNAWAY WELL MAKES LAKE: FARMER MAKES PROFIT

Here is the story of a farmer, in drought-stricken North Dakota, who asked for a well and received a lake. And when he bemoaned the lake because it robbed him of 200 acres of his best land, it began to return him a larger profit than the crops it displaced. The well drillers had to go down 2,300 ft. before they struck water in that arid region. But when they did strike it, the drill rods shot from the ground, and the escaped water gushed and surged into all the hollows on the farm. Lakes were scarce in that section. It was quite a curiosity to the neighbors—and, also, to the wild ducks, which promptly discovered the new swimming hole. So the farmer, despoiled of his crops, planted a fleet of rowboats, and turned some acres into building lots for city folk.

SPRINGS ON TIRE CHAINS PREVENT FLAPPING

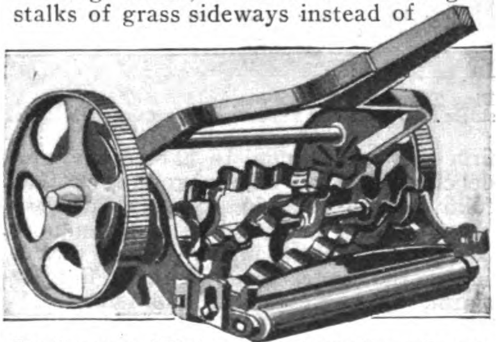
The familiar rainy-day "click-click-click," as loose tire chains slap against auto fenders, is stopped by applying a simple coil spring, recently patented, to each wheel chain. Springs for that purpose are now a recognized commodity. Once on, they remain a part of the chains, which then always hug the tire and yet are loose enough to creep as they should.



One Small Coil Spring Like This Attached to Each Tire Chain Holds It Snugly against the Tire

MOWER FOR GOLF GROUNDS HAS CORRUGATED BLADES

Lawn mowers of the familiar form, with slanting blades, often slide the tougher stalks of grass sideways instead of cutting them. A Pennsylvania inventor overcomes this fault by the simple means of substituting corrugated blades for the straight ones. The grass, caught in the recesses, cannot escape and is instantly decapitated. The remarkably clean, close work of this machine recommends it for such particular tasks as mowing golf links.

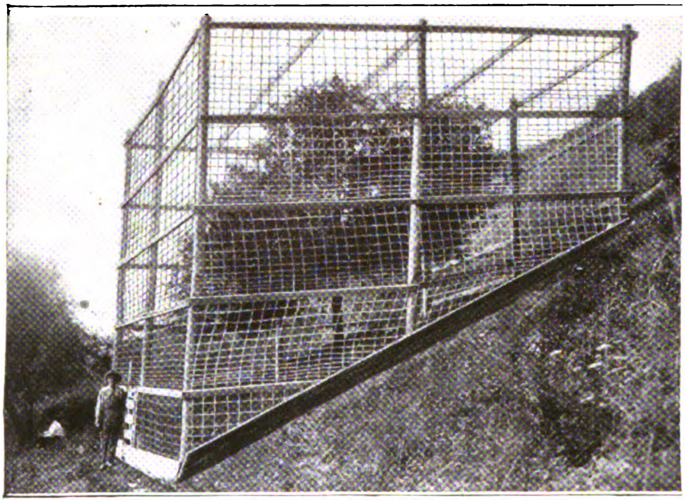


The Corrugated Blades of This Lawn Mower Prevent Tough Stalks of Grass from Slipping Sideways and Escaping

TRACTOR PULLS TRAILER DOWN LONG HOSPITAL CORRIDORS

A great army reconstruction hospital is divided into so many wards that transportation of the wounded within the building becomes a problem in itself. It has been solved in one institution, however, where an electric tractor quietly hauls a smooth-running trailer bearing 10 disabled soldiers up and down the long corridors. With careful operation the many trips are made without a jolt or jar to cause discomfort to the patients.

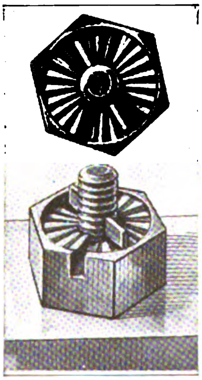
CAGE AND BURGLAR ALARM PROTECT APPLE TREE



Five Thousand Dollars was Paid for This Apple Tree. It is Now Considered So Precious That Every Precaution is Taken against Trespassers

When a West Virginia mountaineer sent three apples to a Missouri nursery firm they were found to have a new and delicious flavor. The negotiations that followed resulted in $5,000 being exchanged for a seedling that is now almost 20 ft. tall, and so highly valued that a substantial cage, fitted with a burglar alarm, makes trespassing impossible.

NUT LOCKS FIRMLY ON BOLT BUT IS EASILY REMOVED



A novel kind of lock nut, which cannot be accidentally loosened on the bolt, but is readily removed with a wrench, has been designed by a woman inventor. A recess in the top of the nut is shaped at the bottom like a shallow spiral stairway. The nut is turned onto the bolt, and a short cotter pin is inserted through a slot in the bolt. Tightening the nut engages the pin with the notches or "stairs" of the recess, which position it holds until forcibly disengaged. With the cotter pin removed it acts as an ordinary nut.

"SIGNS" OF OLD-TIME FARMER VINDICATED BY SCIENCE

New-fashioned folk who have been laughing at the old-fashioned farmer's "signs" had better straighten their faces. Science, represented by the Department of Agriculture, not only sanctions much of the agriculturalist's dependence on common phenomena of nature, but is actually plotting a kind of "nature's index" based on the same kind of observations. To take a homely example, the farmer is likely to rush his late harvesting when the cockleburs start to ripen, and to plant his winter wheat between the late bloom of the tall goldenrod and the turning of the hickory leaves. When these indeterminate events vary from year to year, he varies his planting and harvest days to agree with them. And now the scientists tell him he is right in that practice, and not only to keep it up but to add to it. What is more, they intend to help him. A catalogue of "index plants" and signs is being prepared which correlates all these orderly activities of nature. Based on a study of seasonal sequences covering many years, it reduces the significance of its records to absolute mathematics, and announces their meaning in terms as simple as the farmer's own expression of the old-time beliefs.

NAVY RECRUITS GET OUTFITS WHEN FOUND MENTALLY FIT

Mental defectives were formerly discovered in the navy only after some weeks of training and much valuable equipment had been wasted upon them. This is no more the case, however, at a large inland training station, where the recruit is now psychologically examined immediately on entering the service. If found wanting he is either sent to a hospital for observation and discharge, or assigned to a company where his commander will keep him under constant surveillance. What gladdens the quartermaster, though, is the fact that the recruit doesn't get his suits until he has proved he can make good.

CENSUS OF WILD ANIMALS

By W. F. WILCOX

WHILE the government takes a census every ten years of its human beings, it does not forget its wild inhabitants. The district forester of Colorado has made a report on the wild animals in the state on the national forest reserves, which presents some rather startling figures.

Since 1913, 325 head of elk have been brought from the Yellowstone Park region to the mountains of Colorado. There has been a constant increase of this herd until now there are over 5,000 elk in Colorado. In the year 1917-18, the increase was 480 animals.

A four years' closed hunting season resulted in an increase in deer, although not so considerable as is desirable, on account of the depredations of coyotes and mountain lions, hundreds of deer being killed each year by predatory wild animals. There are now some 23,000 deer on the national forests of the state. Although antelope are protected by law, their number is practically stationary. Only a few of these animals remain in the state, the number being 45 for 1918. There are 43 white-tailed deer in the state and 22,642 mule deer. The latter decreased somewhat in 1918, as there were three days of hunting and about 1,100 were killed during this time.

To Preserve Game and Stock, a Bitter Campaign is Waged in Colorado against Wolves and Coyotes. This Dejected Wolf has Dragged His Trap until Exhausted and Now Seems to Realize What's Coming to Him

Mountain sheep are slowly and steadily decreasing in number, principally because of loss from wild animals, but also, perhaps, because domestic stock has encroached upon ranges formerly occupied by this game. Mountain sheep decreased from 7,435, in 1917, to 7,123, in 1918.

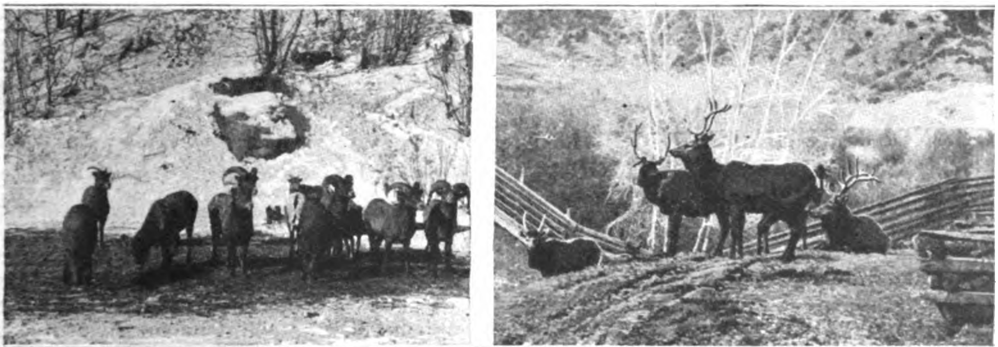
Each Wildcat Has a $50 Share in Colorado's Annual $1,000,000 Loss from Predatory Animals

Beaver are increasing rapidly. In 1917, there were, according to estimates, 12,914 on the forest reserves, and, in 1918, 22,642.

Bears are becoming very scarce. There are estimated to be 2,176 black and brown bears in the state, against 2,141 in 1917. Silver-tip bears decreased from 143, in 1917, to 79, in 1918.

Mountain and willow grouse are not materially increasing. The sage hen is on the decrease. The ptarmigan is stationary. Some predatory animals are on the increase. Coyotes in the national forests increased from the 1917 estimate of 23,320 to 24,895, in 1918. Lynx and bobcats decreased from 6,473, in 1917, to 6,296, in 1918; mountain lions diminished in numbers from 771 to 674; wolves, from 264 to 258.

It is estimated that in 1917, 2,991 coyotes were killed, and in 1918, 3,967. In 1918, 13 wolves, 32 mountain lions, and 544 wildcats and lynx were killed in the state.



The Careful Count Kept of Colorado's Wild Animals Reveals That Larger Stock Ranges and Predatory Animals are Reducing the Number of Mountain Sheep; but the Herd of Elks, of Which a Few are Shown on the Right, has Grown from 325 Head in 1913 to 5,000 Last Year

BEAUTIFUL BATHING POOL IS BARGAIN IN LUXURY

A private bathing pool, big enough for a park, and provided, indeed, with a veritable park setting, would seem to be an expensive luxury. Yet such a feature on a southern California estate, beautiful and impressive as it is, represents in itself an investment of less than $1,000. The basin and ornamental fountain are of concrete. A vine-clad pergola, surrounding the pool, is responsible for much of its effect of magnificence. The four-room bathhouse is simple, but beautified by skillful gardening. The warm-water supply costs nothing, as the pool forms a link in the irrigating system, and a solar heater in the supply line gives just the right temperature.

The Bathhouse Is Simpler Than It Looks. Careful Gardening Is Responsible for the Luxurious Effect

Basin and Fountain Are of Concrete, and Not Nearly So Expensive as They Appear. Here Again the Semblance of Magnificence is Contributed by Gardening and a Pergola Background

A Better View of the Arrangement of Pergolas, Which Entirely Surround the Pool, Bathhouse and All, and Make a Delightful Green Setting

CHANGES IN SIMPLON TUNNEL SYSTEM OF VENTILATION

Ventilation of a railway tunnel is always a problem, though greatly simplified when the railroad is electric, as in the Simplon tunnel. This double-barreled bore through the Swiss-Italian Alps originally obtained its fresh air from water-driven fans. The installation has been changed to electric drive since the second bore was enlarged. The air ducts, which curve from the fans to the tunnel, are of reinforced concrete, separate for each bore. A modification of the somewhat curious plan originally adopted is now in use. When a train has entered the tunnel, a sliding curtain of sailcloth is lowered behind it, closing the mouth of the bore. The fresh air pumped in then disperses along the direction of the train. It is easier to pump air from north to south than the reverse, because of prevailing barometric differences.

STRAY MINES WILL IMPERIL SAILORS FOR MANY YEARS

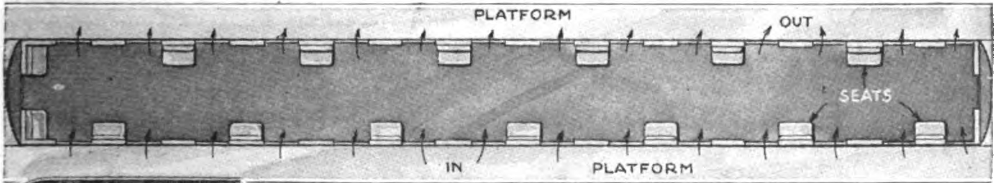
Stray mines, estimated to number between 5,000 and 10,000, are known to be afloat in the waters of the Atlantic Ocean and the North Sea. They are a very real danger to the sailor, and will continue to menace him for 20 years, more or less, depending on their watertightness. To comb the seas for them is obviously impossible; yet the danger may be minimized by careful study of charted ocean currents along which the mines will float. Thus a well-known hydrographer has reported to the French Academy of Sciences that mines broken loose from their fastenings in the English Channel will drift southward past France, Spain, and Morocco to the Canary Islands, where they will turn westward to the West Indian group. Here they will scatter, some to drift eastward again toward the Bermudas, the Azores, and the Madeira Islands; some, indeed, to return to the Channel to begin the four-year journey once again. He also states that the coast of the United States is fortunately protected from this peril by the polar currents which sweep southward to the coast of Florida.

DOWNFLOW OF STEAM QUICKENS GAS-RETORT PRODUCTION

In the common gasworks practice of passing steam through the coal for the generation of water gas, it is customary to admit the steam at the bottom of vertical retorts, whence it travels upward with the other products. An English gas engineer, during the last three hours of a 12-hour distillation period, passes the steam downward through the remaining coke and refuse. The top gas outlet being closed, the steam and products issue at the bottom and then enter the base of another retort, moving upward again. With this arrangement a ton of English coal yielded 17,483 cu. ft. of gas of 504 B. t. u., and ammonia liquor equal to 33 lb. of ammonium sulphate—a considerable increase over the usual results.

SPECIAL CARS FOR "SHUTTLE" TRAINS IN GOTHAM SUBWAY

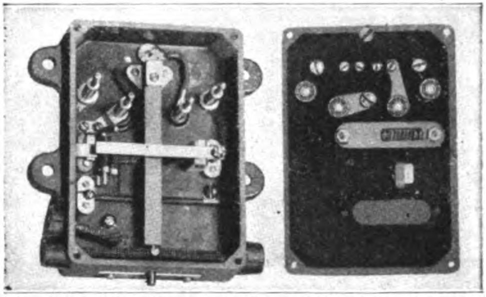
Among the several suggested methods of ameliorating the serious traffic problem that has faced New York since the opening of the Forty-Second Street crosstown subway "shuttle," is the construction of sliding-wall cars that may be loaded and unloaded quickly. At the present time, congestion at the Grand Central terminal during the morning and evening rush hours is unendurable. Therefore it is proposed special cars be used for the "shuttle" trains. Doors, 2½ ft. wide, sliding in stationary wall sections of the same width, would enable one-half of the wall space to be opened on each side of a car. This arrangement would permit a train to discharge passengers from one side and receive them from the other, simultaneously. Obviously such a scheme would not only save time, but also prevent the milling of the crowd. Of course, the plan would necessarily reduce the seating capacity of a car, but this is not considered a drawback, for the distance between the terminals is very short, and "shuttle" passengers would be forced to stand only a moment or two.



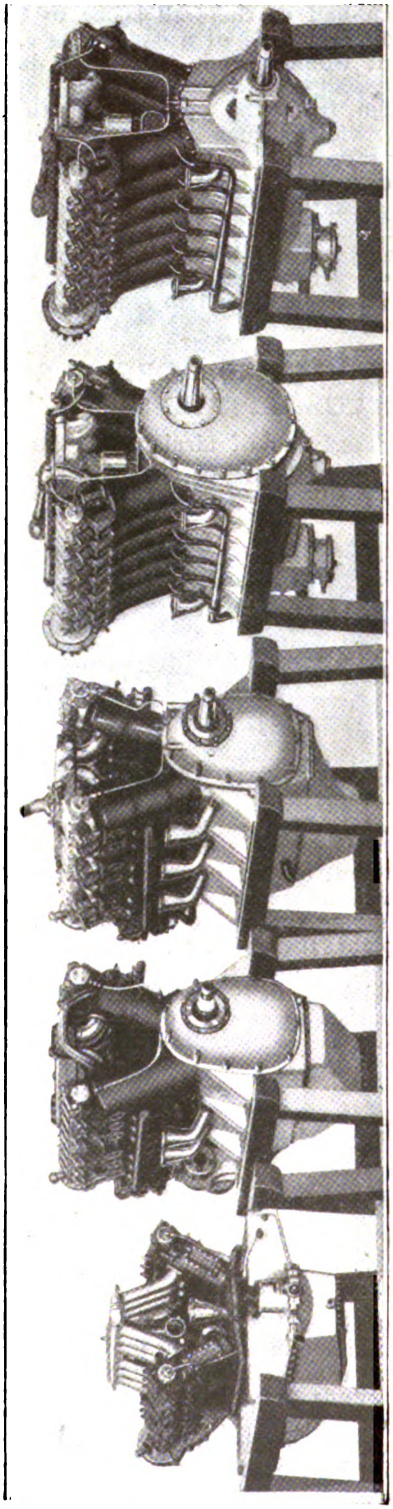
Above Is the Plan of a Subway "Shuttle" Car, with a Series of Doors the Full Length of Each Side. An Idea of the Outside Appearance is Gained at the Left

IGNITION-CIRCUIT BREAKER ADDS TO AIRPLANE SAFETY

Most dangerous of airplane accidents is a broken propeller. It throws the whole structure out of balance before the pilot can shut off the power. An instrument which interrupts the engine's ignition circuit on the first oscillation of the injured plane, therefore, classes as an important safety device. Such an instrument, which is daily demonstrating its value, consists essentially of a metal bar pivoted like a pendulum, held normally in central position by compression springs. When oscillated, however, it moves a pivoted crossbar and releases a trigger, which either grounds or interrupts the ignition circuit, instantly shutting off the motor. It is reset with a push button. The total weight, in the mounting case, is less than 10 ounces.



At the First Lurch of an Injured Airplane, the Lever Swings Over and Breaks the Ignition Circuit



BY COURTESY OF THE PACKARD MAGAZINE

THE LIBERTY MOTOR'S DEVELOPMENT FROM NOVEMBER, 1915, TO ARMISTICE DAY

SEVENTEEN months before America entered the war the Liberty motor existed in embryo. Its forebear was the 12-cylinder engine of auto-racing fame pictured first at the left. With its piston displacement multiplied by three, the next model was built in April, 1916, and a similar model, with all-steel cylinders, came forth just a year later. The original Liberty motor, at the extreme right, developed out of five days' concentrated study of these previous models. The first one was completed July 2, 1917; the final model, fourth from the left, in January, 1918. By November 11 more than 15,000 of them had been made.

COLLEGE OF FISHERIES AT STATE UNIVERSITY

The College of Fisheries, just established by the University of Washington, at Seattle, the busy Pacific fishing center, is the only one in the world aside from the Imperial Fisheries Institute at Tokio, Japan. The four-year course will be offered to the student in three divisions, fishing, technological, and fish-cultural. In the first he will study business management, the history, methods, and laws of fishing, and the construction, operation, and repair of boats and other fishing apparatus. In the technological course he will prepare aquatic products for all sorts of industrial and commercial uses, thus qualifying himself for work in an industrial plant or experimental laboratory. And in the third, the fish-cultural course, the study of the culture and protection of fish will fit him for a position in a government or private hatchery. In addition, like the other departments of a state university, the College of Fisheries will render assistance to state authorities and citizens, will engage in research work, and offer short winter courses to those without time or money for the four-year course.

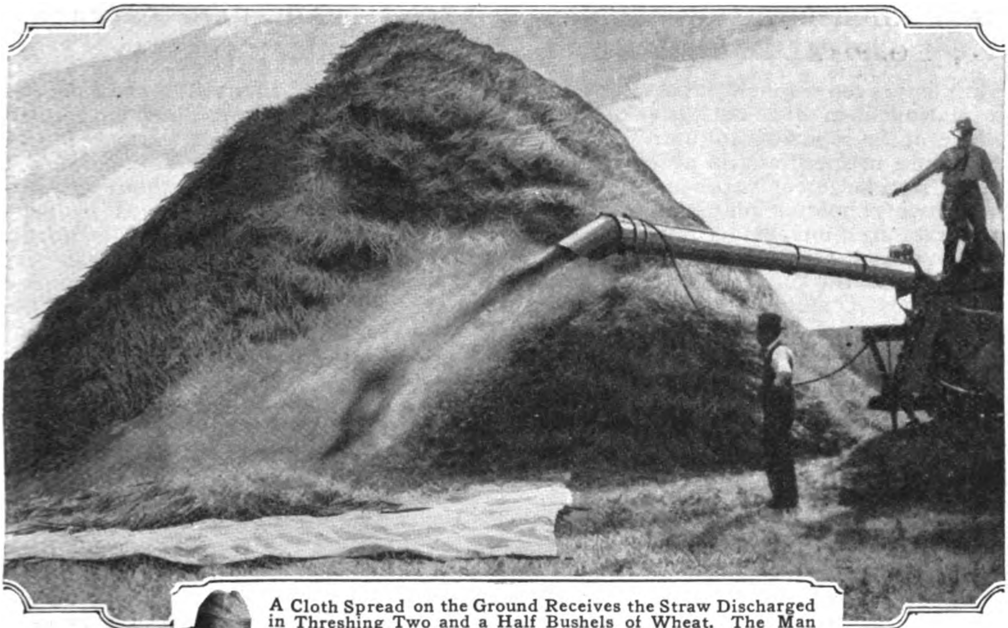
X-RAYS TEST CONCRETE SHIPS FOR HIDDEN DEFECTS

Intrinsic faults of concrete are as obvious to the X-ray as are mere anatomical irregularities. By a process originating on the Pacific coast, a series of radiographs taken during the building of a concrete ship, form a positive check on uniformity and compactness, and allow detection and correction of voids and improper locations of reinforcing before it is too late. The X-ray equipment, which weighs only about 90 lb., may also be usefully employed in studying the hidden effects of service strains on concrete ships which have already faced the sea.

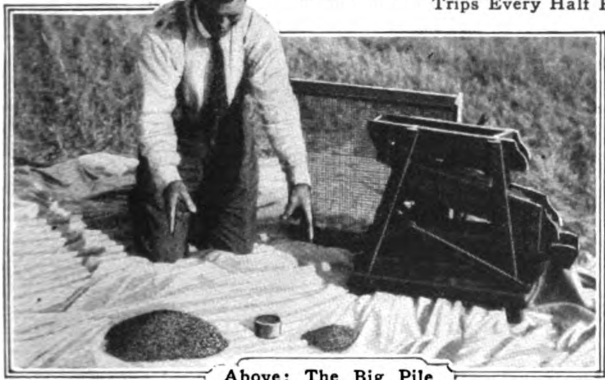
MOSQUITOES GIVEN PLACE IN NATIONAL MUSEUM

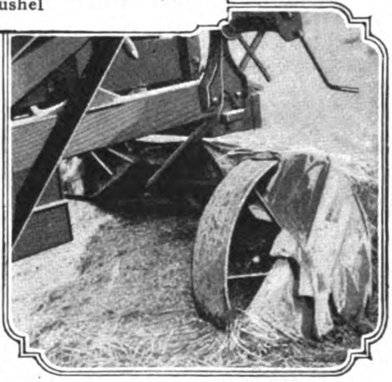
Mosquitoes representative of all species found at camps where army troops are stationed are being assembled for display at the Army Medical Museum in Washington, D. C. Besides prescribing most carefully the manner of collection, the order directs that they be shipped to the museum in lots of 25 each.

SAVING WHEAT WASTED BY THRESHING MACHINES



A Cloth Spread on the Ground Receives the Straw Discharged in Threshing Two and a Half Bushels of Wheat. The Man on the Machine Watches the Weighing Device, Which Trips Every Half Bushel





Above: The Big Pile Indicates About Eight Pints of Wheat Wasted. The Small Pile was Produced by the Test After the Machine had been Adjusted. Right: Properly Placed Canvas could have Saved the Wheat on the Ground

Sifting the Straw on the Cloth to Recover the Wheat and Chaff: The Latter is Blown Out Afterwards

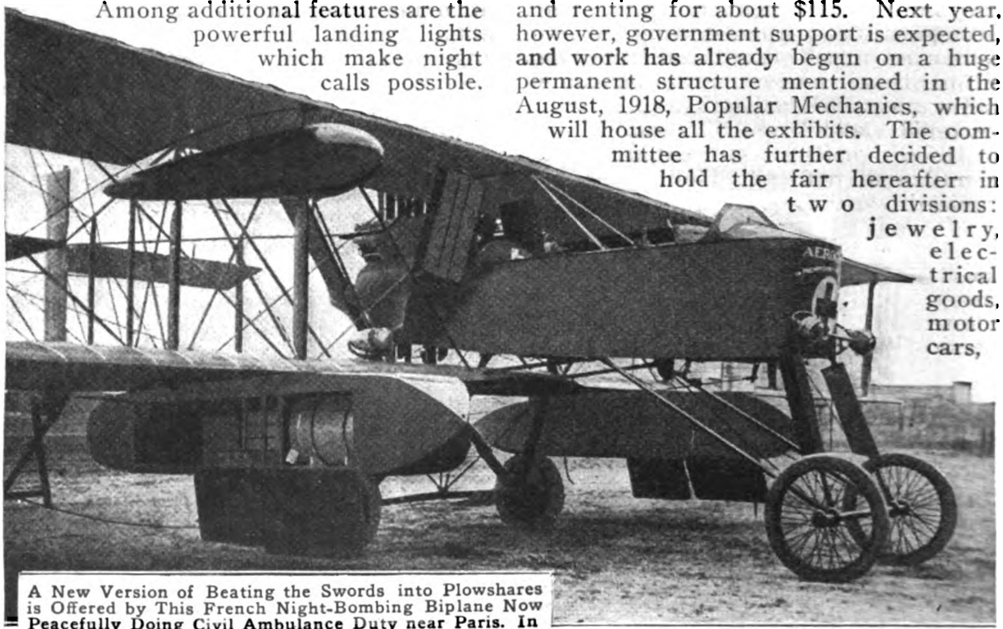
Proper Feeding of a Threshing Machine by Pitching the Wheat Evenly, Heads First: The Canvas Underfeeder Is Necessary to Catch Straw, Loose Grain, and Bundles

AERIAL AMBULANCE CARRIES HOSPITAL EQUIPMENT

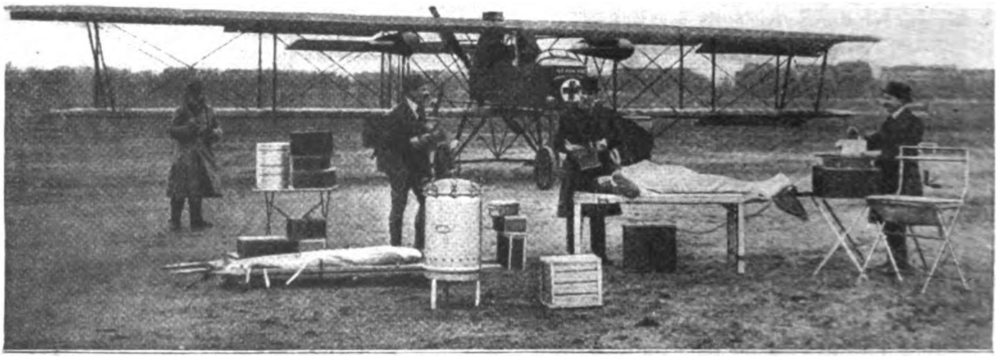
An improved French aerial ambulance is stationed in the outskirts of Paris, where it is reported to outdo its land rival both in speed and in equipment carried. Two large compartments under the lower wing hold a complete emergency hospital outfit, including stretcher and operating table. On arriving at the scene of the accident, the sufferer is thus given the advantage of immediate surgical attention. The operation over, the patient may be stretched out comfortably in the long nacelle and hurried to a city hospital. Among additional features are the powerful landing lights which make night calls possible.

LYONS TRADE FAIR ATTRACTS AMERICAN DISPLAYS

The success of this year's trade fair at Lyons, France, first promoted in 1916 to compete with the famous German fair at Leipzig, has made it an affair of annual international interest. Without government support and handicapped by wartime congestion of shipping and railroads, the fair nevertheless attracted this year nearly 5,000 exhibitors, including many Americans, a substantial gain over the 1,342 of 1916. The exhibits, valued at $4,000,000, were scattered through the city in small booths with an area of 20 sq. yd. and renting for about $115. Next year, however, government support is expected, and work has already begun on a huge permanent structure mentioned in the August, 1918, Popular Mechanics, which will house all the exhibits. The committee has further decided to hold the fair hereafter in two divisions: jewelry, electrical goods, motor cars,



A New Version of Beating the Swords into Plowshares is Offered by This French Night-Bombing Biplane Now Peacefully Doing Civil Ambulance Duty near Paris. In the Picture the Doors have been Lowered to Reveal the Emergency Operating Equipment Tucked Away in the Two Compartments below the Lower Wing



PHOTOS COPYRIGHT, KEYSTONE VIEW CO.

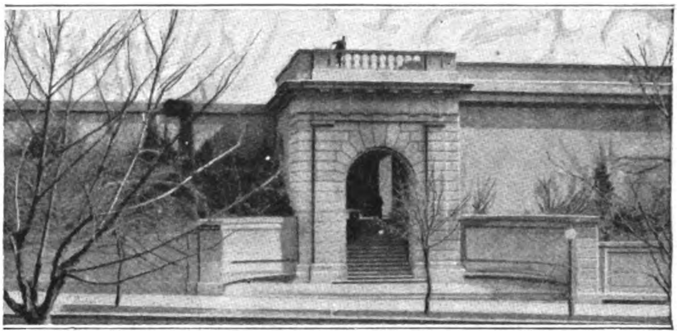
On Finishing the Actual Operation Which They are Simulating Here, the Surgeons would Place the Patient in the Long Nacelle, Pack the Equipment Away in the Two Compartments under the Lower Wing, Step Aboard and Fly Back to the City Hospital etc., from March 1 to March 15, with metallurgical, industrial, and agricultural machinery, and foreign and colonial exhibits from October 1 to October 15.

COUPLE EXPECT IN TEN YEARS TO WALK AROUND GLOBE

A Canadian couple left last January for a walk which will take about 10 years. Before they return, according to their plans when they left Montreal, they will have traveled clear around the world on foot. Success in this undertaking would make them eligible for a prize offered by a society of authors in Paris, France, the winning of which is one of the objects of their long ramble. The masculine part of this light marching company served at the front with the Canadian Expeditionary Forces, and was discharged after his recovery from a serious wound.

ENTRANCE OF CLASSIC DESIGN LEADS TO PLAYGROUND

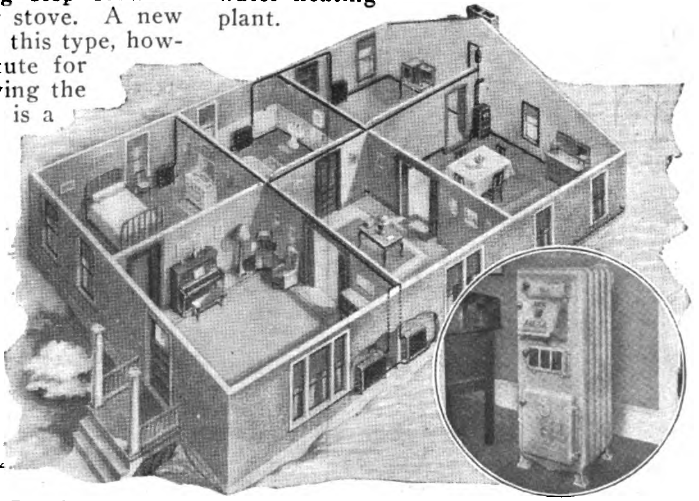
An improvement of simple dignity is this retaining wall and stairway, leading from an important thoroughfare to a Washington, D. C., recreation park on a higher level. The stern lines of the masonry will soon be softened by shrubbery and flowers, planted on the terrace which breaks the front of the wall. Practically all the work is of poured concrete, with paneling composed of smooth pebbles.



This Well-Designed Concrete Retaining Wall Is a Welcome Change from the Usual Unsightly Constructions. The Steps Lead from a Washington Boulevard to a Playground on a Higher Level

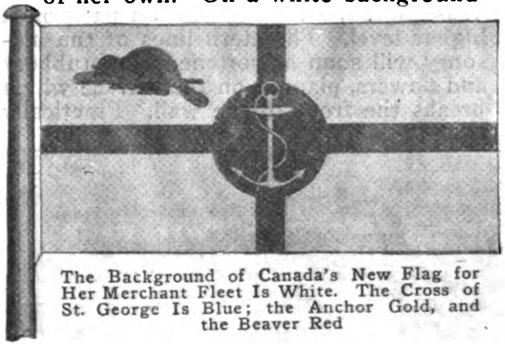
HOT-WATER HEATING PLANT FOR CELLARLESS HOUSES

Hot-water heat is popularly regarded as the acme of luxury in house-warming arrangements, and a long step forward from the old base-burner stove. A new development in heaters of this type, however, is actually a substitute for the "parlor stove," occupying the same place if desired. It is a combination of boiler and radiator, looking more like the latter. It has the additional advantage over a stove that other radiators, in other rooms, may be connected with it, distributing the heat over any desired floor space. Since no cellar is needed, the new heater appeals particularly to occupants of farm and country houses, and one-story buildings of all kinds. The whole outside surface of the boiler-radiator is water-lined, so it never becomes dangerously hot, and may be enameled any color to harmonize with decorations. It may be installed in any room having a chimney-flue outlet. Despite its small size, it is a full-fledged hot-water heating plant.



This Combined Radiator and Boiler Takes the Place of the Old-Fashioned Stove for Heating Cellarless Buildings. Radiators in Other Rooms may be Connected with It to Distribute the Heat, Making a Complete Hot-Water Heating Plant. It can be Enameled to Match the Decorations

CANADA'S MERCHANT FLEET FLIES NEW FLAG

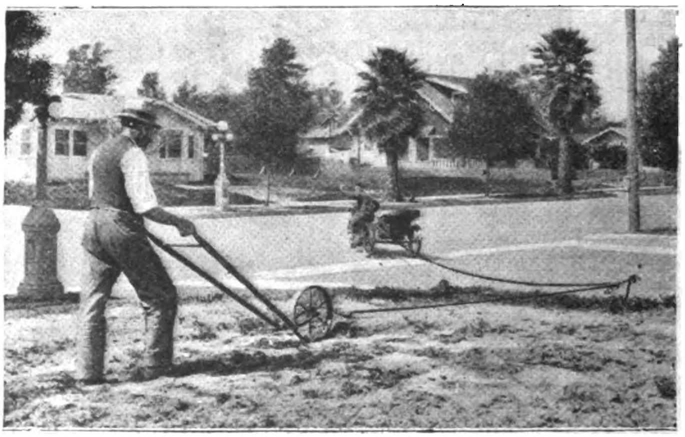


The Background of Canada's New Flag for Her Merchant Fleet Is White. The Cross of St. George Is Blue; the Anchor Gold, and the Beaver Red

To fly at the mastheads of her new merchant marine Canada has designed a flag of her own. On a white background appears the cross of St. George in blue, bearing a golden anchor in the center, and inclosing Canada's national animal, the beaver, in the upper left-hand corner. As shipbuilding keeps pace with development of forests, mines, and farms, Canada hopes to fly this flag over Canadian ships in every corner of the world.

MOTORCYCLE USED AS TRACTOR FOR PLOWING HOME GARDEN

Out in California, one ambitious home gardener, denying the right of the big growers to monopolize power farming, hitched a motorcycle to a hand cultivator and finished his 50 by 100-ft. garden in an hour. A long rope and a pulley fastened to a crowbar, driven at the edge of the lot, allowed the motorcyclist to do his tractoring on smooth pavement.



The Motorcycle "Tractor" can Operate at Any Angle to the Hand Cultivator It is Pulling, Because of the Long Rope Connection and the Pulley on the End of the Crowbar. The Latter is Shifted for Each Row

LEAD ELECTRICALLY HARDENED IS NEW BEARING METAL

Out of the war shortage of tin has come a new and successful substitute for babbitt as a bearing metal. It is composed almost wholly of lead, hardened by an electrical process. Its high manufacturing cost is more than compensated for by the low market price of lead compared with tin. The new metal shows a tensile strength of 13,000 lb., the figure for genuine babbitt being 11,000; and an elastic limit of 11,525 lb. as against 10,000 for babbitt. Its friction factor is very low. With a shaft running at 400 r. p. m. and a load of 1,000 lb. per sq. in., 150° was the highest temperature reached by the bearing.

WITH NEW SIGHTS MARINES MAKE HIGH RIFLE SCORES

Everybody "hands it" to the marines for marksmanship, but scores from the Paris Island range suddenly became so very excellent that official suspicion was aroused. Scores were checked and rechecked; the men were even compelled to shoot the course again, with officer observers in the pits and on the firing line. But the scores were as high as before. Only then was it discovered that the reason lay in the new rifle sights used, which had been issued for trial recently.

RAILROAD REORGANIZATION SCHEDULED IN CHILE

Despite the sharp slump in the nitrate market on the cessation of hostilities, the Chilean government has approved an extensive program of railroad reorganization, comprising chiefly a bond issue of 89,000,000 Chilean gold pesos (about $32,500,000). The entire government rail system, which includes most of the national mileage, will be modernized by extensive purchases and by the installation of a block system. It is planned, also, to electrify the section between Valparaiso, the chief seaport, and Santiago, the national capital, a distance of about 60 miles.

Part of the Salvage Department of an Army Camp, Where Everything from Machine Guns to Straw Bedding is Gathered Together, to be Adapted to Further Use or to be Sold: Boxes, Barrels, and Other Containers Form a Large Portion of the Stock, Though It 'would Be Hard to Name Any Commodity Which is Not Represented. At One Camp the Salvage Corps Consists of a Captain, Five Lieutenants, and 545 Men

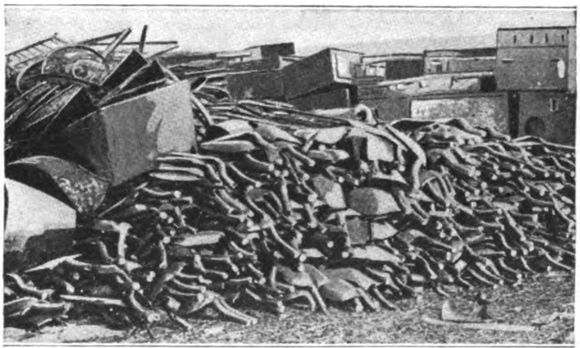
SALVAGE OF WAR MATERIAL IS ENORMOUS TASK

One of the busiest places at the army camps just now is the salvage department, where machine guns, rifles, bayonets, blankets, trouser buttons, gas masks, haversacks, belts, shoes and lacings, horseshoes, barrels, wagons, motorcycles; motor trucks, field wagons, mattresses, iron cots and springs, old brass and iron, waste paper, rags, boxes, bottles, etc., are being collected and turned in to be gone over by trained experts and assorted ready for disposal.

The magnitude of the task is illustrated by the fact that at Camp Devens, for instance, one captain, who is salvage officer, five lieutenants, and 545 men are working daily to handle the vast amount of war material. Included in this corps are experts on every kind of material used by our soldiers.

Since the armistice was signed, releasing thousands to civil life, the amount of salvage, of course, has increased many fold. The intent is to dispose of everything in some way, to waste nothing. Even the straw in the men's bedsacks is bringing in money. The sacks are emptied and the straw is piled into huge dumps. Part of it is baled and reissued as bedding for animals. The rest is sold as food for hogs and for mulching.

Metal material that is not worth salvaging is placed in a common dump.



Literally a Junk Pile, Containing Metal Parts and Materials No Longer Useful for Their Original Purposes, But Still Worth Some Kind of a Price: Worn-Out Shovels Constitute a Major Part of This Particular Pile. This Kind of Salvage is All Sold for Cash

Great heaps of old motorcycle bodies, bed springs, cot frames, auto wheels, old rusty stoves, worn-out shovels, and the like, are spread all over the salvage park. But it is all sold, and is paid for before it leaves camp.

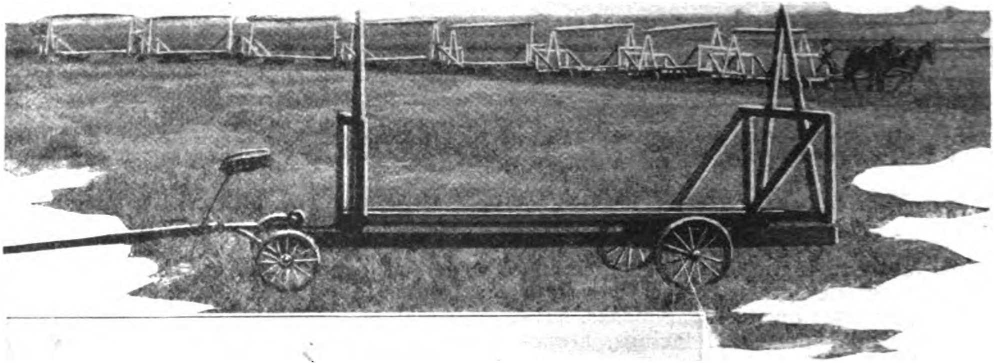
Old hats are baled and sold for felt. Shoes that are in fair condition are repaired, and it is understood that many of them will be sent to Europe for use of civilians in the devastated areas of France, Belgium, and Serbia.

Brass cartridge cases, formerly returned to the munition makers after firing, are now dumped into boxes and barrels, and sold for old brass, while unused cartridges are returned to the arsenals for storage.

Two warehouses are used at Camp Devens for sorting, cutting, and storing clothing and cloth materials. Some of the clothing fit for civilian use, which has never been issued to the men, is being sold to discharged soldiers at cost price.

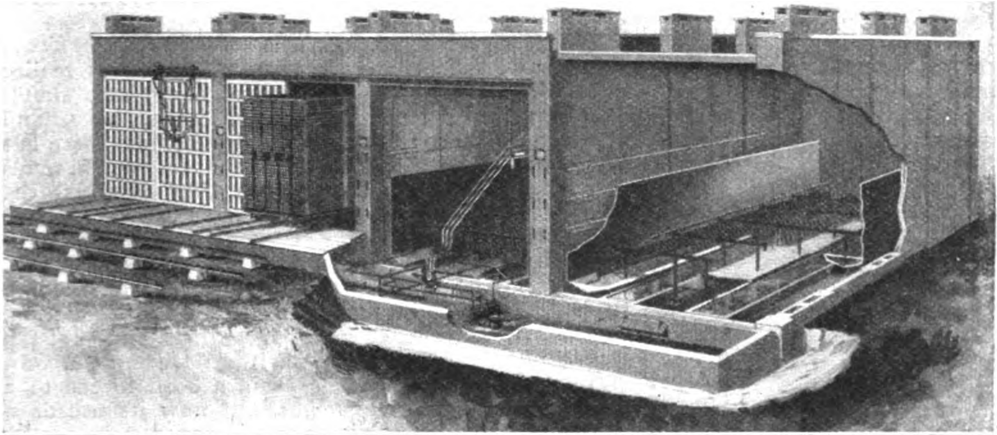
For nearly every single thing in the American soldiers' equipment some different peace-time use seems to have been found. An exception so far is the gas mask, for there is less to be reclaimed from it than from most other war material. Unfortunately, it has been found that the masks do not lend themselves to industrial uses, so that they cannot be disposed of complete, but there is much material that goes into making of them, such as rubber tubing and sundry metal parts, that will be sold at public auction.

TRUCK METHOD OF CURING HAY SAVES LOSSES



Above Is an Empty Hay-Curing Truck Hitched to a Pair of Wheels for Hauling. At the Left the Process of Loading the Truck is Seen. Below is Pictured a "Town" of Loaded Trucks, with Canvas Covers in Place, Curing Their Hay in the Field

Hay growers in moist climates have trouble in curing their crops. Difficulties of this kind led a Mississippi grower to design a truck on which 1,500 to 2,000 lb. of hay may be cured and expeditiously handled. The truck resembles an ordinary hayrack, except that the usual front wheels are replaced by a pivoted leg or trigger. This, with the rear wheels, supports the truck in the field. A-shaped standards, at front and rear, support a removable ridge pole, over which a can-



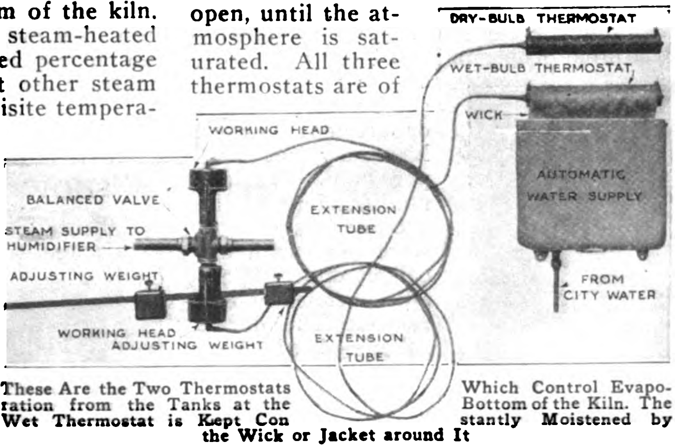
Temperature and Humidity are So Carefully Regulated in This Drying Kiln That Lumber does Not Check and Caseharden from Irregular Drying. Thermostats Automatically Control Heat Supplied by the Steam Coils, and Evaporation from the Water Tanks at the Bottom

vas cover is hung while curing. Hauling is done with a two-wheel running gear coupled to the front, the trigger dragging lightly. A train of several empty trucks may thus be hauled. The process saves labor and prevents spoiling of hay in unfavorable weather.

AIR IN LUMBER-DRYING KILN AUTOMATICALLY ADJUSTED

A lumber-drying kiln has been planned that is claimed to be so sensitive in its adjustment of temperature and humidity that losses from irregular drying and consequent casehardening and checking will be greatly reduced. In a very few words, air is admitted at the bottom of the kiln, is passed over tanks of steam-heated water that give it the desired percentage of moisture, and is led past other steam coils that heat it to the requisite temperature. It then rises through the piles of wet lumber, where it is cooled, and guided down the side walls to the tanks again, thus circulating constantly.

The thermostats which control the warmth and humidity of the air are most interesting, however. To regulate temperature an ordinary thermostat controls flow to the steam coils; but to regulate humidity two are used, to act against each other in a valve and thus govern admission of steam to the vaporization tanks. One thermostat is dry and is affected only by the temperature of the air; the other, being dampened by a wet cloth, registers a lower temperature, due to the cooling effect of evaporation, and hence exerts less pressure on the valve. In consequence, as the air becomes drier, the valve will open, more steam will be admitted to the tanks, and the humidity will rise again. A weighted lever arm controls the relative action of the two forces and hence the relative humidity of the air. Thus, for a desired relative humidity of 100 per cent, the weights of the valve are set in balance, allowing the dry bulb to act against the wet bulb, and hence keep the steam valve open, until the atmosphere is saturated. All three thermostats are of the fluid-containing type in which temperature change produces change in liquid volume and consequent action upon a steam valve.



These Are the Two Thermostats Which Control Evaporation from the Tanks at the Bottom of the Kiln. The Wet Thermostat is Kept Constantly Moistened by the Wick or Jacket around It

AIR PRESSURE PREPARES MOLD FOR CONCRETE PILING

A geyser spouting mud, clay, and stones amid evidences of contemplated construction work probably indicates that the contractor is using the compressed-air method of preparing molds for concrete piling. In this system the molds, consisting of 12 to 15-in. steel pipes, are driven into the soil without closing the lower ends. An air hose is then forced into the upper end of each pipe and water poured in around it to serve as a resisting medium. When air at a pressure of about 110 lb. is turned on, the contents of the pipe immediately leave at the top, often ascending 25 ft. or more into the air. Some of the ejected fragments are as large as the full pipe diameter could possibly accommodate. When the air tube is removed, the concrete poured in makes a solid and permanent pile.

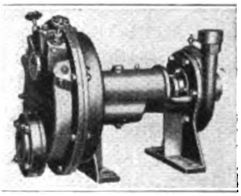
GAS BALLOONS ARE EXPLODED TO RELEASE PROPAGANDA

Exploding a gas balloon with a time fuse, and thereby releasing several pounds of printed propaganda on enemy territory, was an idea suggested to the war department by a Kentucky newspaper man. Various modifications of the proposed system were used with excellent effect by the allied armies in Europe. The device submitted, of which a model is shown herewith, was a hydrogen balloon about three feet high, carrying 20 lb. of pamphlets or circulars. A fuse of calculated length scatters the load by igniting the bag at any desired point.

EXPERIMENTERS FEED BARLEY TO MILCH COWS

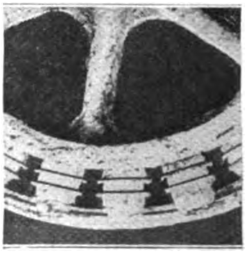
Stockmen in the western states realize the nutritious value of barley as a standard feed for horses, cattle, hogs, and sheep; but among dairy farmers there has long been a tradition that this cereal tends to dry up milch cows. To determine the truth, several of a university herd have been subjected to a five-years' test, as a result of which it is now announced that a long period of exclusive barley feeding actually increased the milk production, lengthened lactation periods, and kept the cows generally healthy. During the war, the price of barley has been forced to a prohibitive height, but now its use as a feed for dairy cows is urged.

SMALL TURBINE-DRIVEN PUMP FOR BOILER-FEED WORK



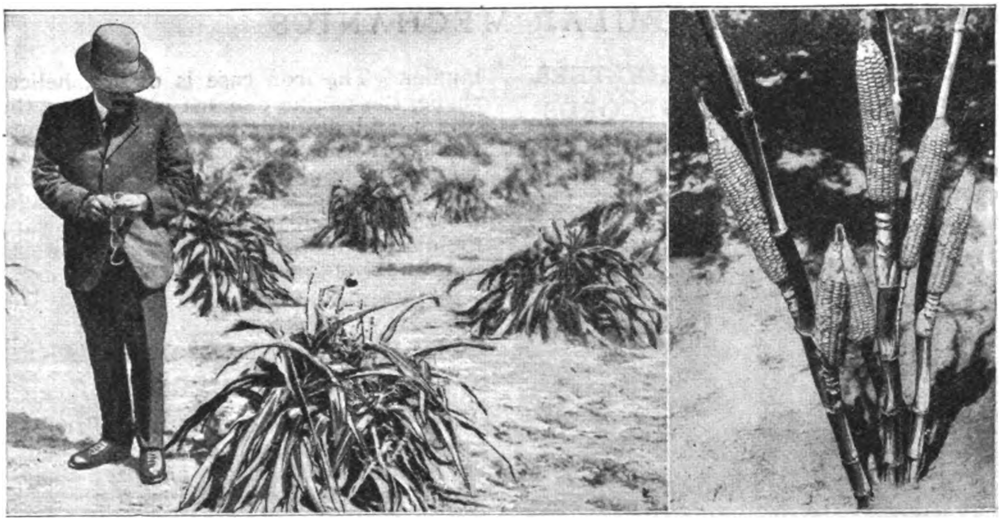
Centrifugal pumps for boiler-feed work, steam-turbine driven by direct connnection, are now to be had in small sizes. The pump, turbine, and supports are combined in a single unit. The solid shaft is hung in two ball bearings, and only one stuffing box is used. The packing between bearings and steam end is a floating carbon ring, the bearings being kept uniformly lubricated by a constant-level oiling device. An excess-pressure governor and a minimum-pressure safety stop make the operation practically automatic.

SURRENDERED GERMAN TRUCKS SHOW RUBBER SCARCITY



COPYRIGHT SIGNAL CORPS, U. S. A.

Another "Made-in-Germany" substitute is this steel tire on a surrendered German motor truck. It will be noticed that the inventor could not entirely eliminate rubber, as pads of that material are placed between tire and rim. Rubber scarcity drove Germany to many similar makeshifts.

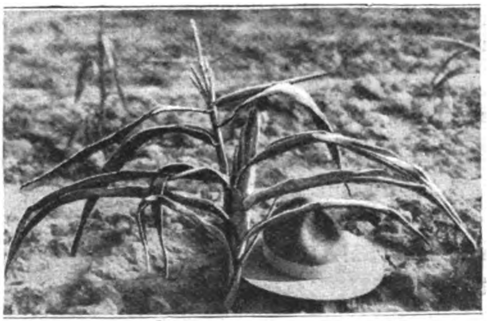


The Picture of a Hopi Maize Field at the Left Gives a Good Idea of the Short, Spreading Nature of the Plant and the Wide Separation of the Hills. At the Right Is a Plant of Deep-Growing Indian Corn

FROST-PROOF CORN GROWN BY INDIANS

By ROBERT H. MOULTON

MAIZE, or Indian corn, in its present form, represents one of the great achievements of primitive planters, the North American Indian. It came originally, it is now generally accepted, from southern Mexico and was eaten by the Maya tribes. At first, it was nothing but a coarse grass on which were tiny ears resembling the top of the wheat stalk. Each grain had its own envelope of husk. Occasionally even now, grains of corn are found which have their individual husk, thus showing how the maize of our day reverts to type. The plant is essentially tropical and, despite centuries of culture in the temperate zone, is still sensitive to frost.



When Maize is Grown in an Unfavorable Location, the Plant Never Grows Very High. The Size of This Specimen of Navajo Maize may be Judged by Comparison with the Hat. The Ear, in Spite of Its Close Proximity to the Ground, Is of Fair Size. This Is the Frost-Proof Variety

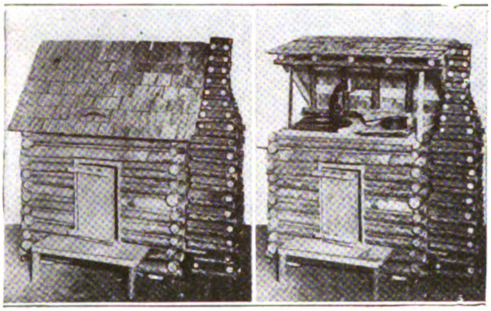
The tribes of North America saw the possibilities of the grain and hastened its evolution. There has been crossbreeding by white farmers, yet, as a matter of fact, the corn culture of the present day is practically as it came from the hand of the Indian. He has adapted and modified it to various sections of the country by a process of careful selection.

It had been accepted for many years that, in the Dakotas and much of the Northwest, it was impossible for the white farmers to grow corn because all the varieties tried were killed by frost. Recently it occurred to some scientists that despite the drawback of the weather the Mandan Indians of the North were raising corn. An expedition made a study of the agricultural methods of the Mandans, and it developed that for centuries the farmers of the tribes had been developing a hardy corn. The seed had been selected from year to year from stalks which showed no effect of frost. The stalks of this variety are so stunted that they are more like shrubs than the plant which is common to more southerly latitudes unaffected by frosts.

The secrets of the cultivation of this strangely acclimated tropical plant were found by an archæologist and not an agriculturist, and were handed over by Buffalo Bird Woman and others of her tribe in the belief that they might help the white neighbors during the recent scarcity of grain, due to the war.

LITTLE LOG CABIN SHELTERS PHONOGRAPH AND RECORDS

With the "roof" in place and the cabin door ajar, it is said that the small log cabin, built by a southern dentist, plays the old plantation songs particularly well. Working in his leisure hours, he built the unique case of small limbs, fitting them carefully, and filling cracks with corrugated cardboard to imitate sun-baked clay.



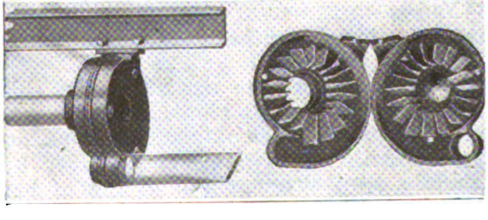
"My Old Kentucky Home" Sounds Just Right When Played by This Machine

WHISTLES OF DIFFERENT TONE ON REFEREE'S HAND

By fastening two whistles of different tone to a leather strap, a combination is obtained that may be of advantage to referees in football or basketball games. Strapped to the hand, both whistles are ready for instant use.

MUFFLER OF HELICAL SHAPE REDUCES BACK PRESSURE

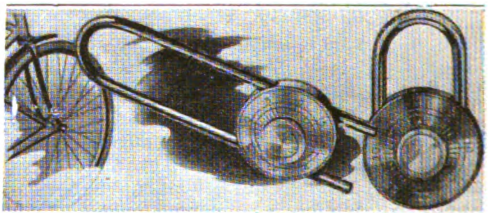
A spirally expanding path for the spent gases is the means used for reducing back pressure in a late form of automobile muffler. The iron case is of flat, helical shape, the engine exhaust entering at the center and discharging at the maximum radius of the periphery. Radically arranged baffle plates guide the gases from the center to the outer annular passage, whose bore increases continuously toward the discharge opening. The small-car size weighs six pounds and is practically indestructible.



Exhaust Gases Enter This Muffler at the Center and Leave at the Periphery. They are Guided into the Outer Spiral Passage by the Radial Baffle Plates

COMBINATION PADLOCK MAKES LOST KEYS IMPOSSIBLE

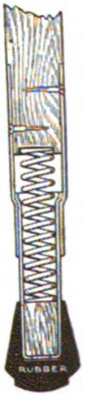
Used by thousands of "Jack Tars" to safeguard the contents of their "sea bags" during the war, a small, compact combination padlock is now offered to the general market. Simple modifications of the "sea-bag" form fit it for use as a common padlock, motorcycle lock, or means of securing valise or trunk. If the owner loses the combination he may get it from the makers by mentioning the registered number stamped on the bow.



Thousands of These Combination Padlocks Guarded the Sea Bags of American Tars during the War. They Are Now Available for General Use

CUSHION SPRINGS LESSEN SHOCKS FROM CRUTCHES

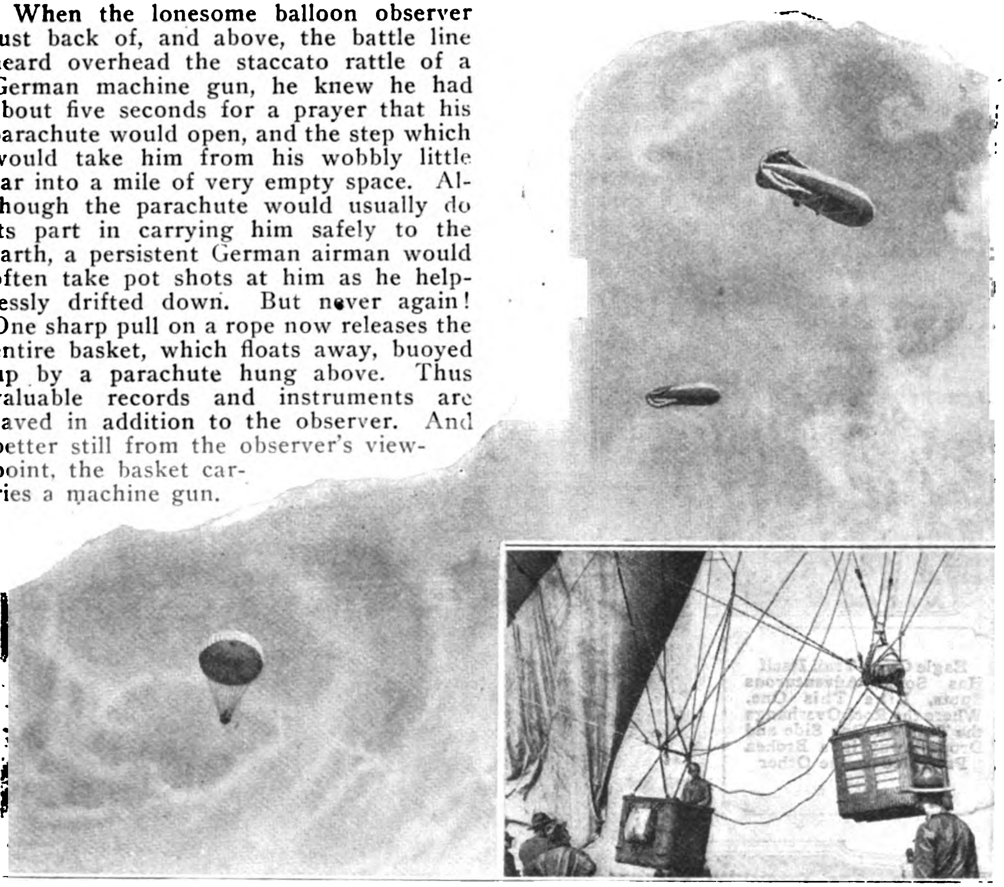
An invention that may prove useful to many wounded soldiers is this shock absorber for the crutch, wooden leg, or walking stick. In construction it is simple, consisting of an ordinary rubber tip that is attached to a short length of seamless tubing. This tube telescopes in a larger one against the resistance of a coil spring. Being free to rotate, it is maintained that the tips do not have to be frequently replaced, as with the ordinary crutch.



¶Miles of red tape recently went by the board when the Navy Department quietly settled obligations to the Railroad Administration with a $10,000,000 check.

NEW BALLOON PARACHUTE SAVES BASKET

When the lonesome balloon observer just back of, and above, the battle line heard overhead the staccato rattle of a German machine gun, he knew he had about five seconds for a prayer that his parachute would open, and the step which would take him from his wobbly little car into a mile of very empty space. Although the parachute would usually do its part in carrying him safely to the earth, a persistent German airman would often take pot shots at him as he helplessly drifted down. But never again! One sharp pull on a rope now releases the entire basket, which floats away, buoyed up by a parachute hung above. Thus valuable records and instruments are saved in addition to the observer. And better still from the observer's viewpoint, the basket carries a machine gun.



The Balloon Basket Itself is Shown Here, Drifting to Earth beneath the Army's Newest Parachute. Contrast This with the Old System in Which the Basket, with All Its Valuable Instruments and Records, were Destroyed with the Bag. The Small Picture at the Right Shows the Parachute Folded Compactly above the Basket. One Pull of a Rope Releases the Basket and Parachute

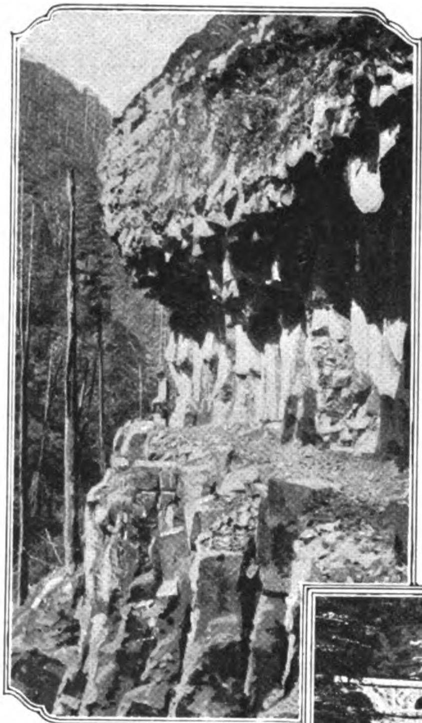
PUBLIC RECREATION GROUNDS IN NATIONAL FOREST

IN keeping with the idea that the national forests are the big playgrounds of the American people, the Forest Service has developed a public picnic and camping ground at Eagle Creek in the Oregon National Forest. These picnic grounds are located 45 miles east of Portland, on the Columbia River Highway, and were visited by nearly 100,000 persons in 1918.

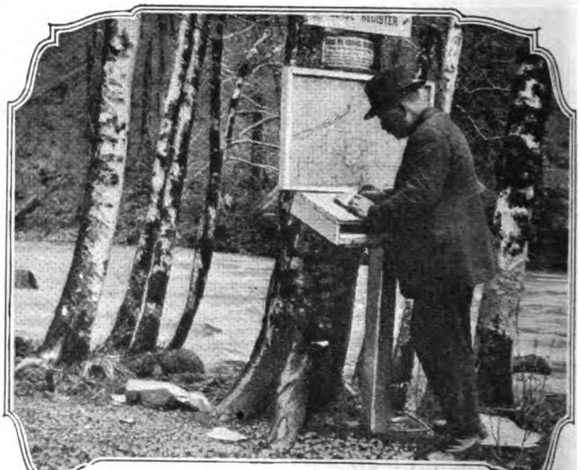
A loop road, surfaced with crushed rock, leads through the grounds so that auto parties may drive directly to a picnic site. Tables, benches, concrete stoves, stone fireplaces, garbage cans, and fuel are provided free by the government. Spring water is piped to all parts of the grounds, and a complete sewer system helps keep the place sanitary.

Scores of camp sites have been cleared up for the use of the public on both sides of the creek, and there is a large parking place which accommodates several hundred machines. Six hundred automobiles have been counted on the grounds at one time. During the last summer, crowds ranging from 2,000 to 3,500 persons visited the place for week-end outings.

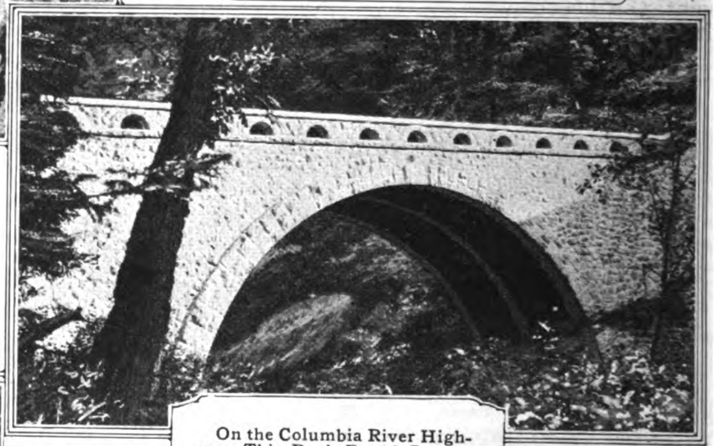
The forest travelers' register, kept on the grounds, last season bore the names of people from 42 states of the Union and a dozen foreign countries.



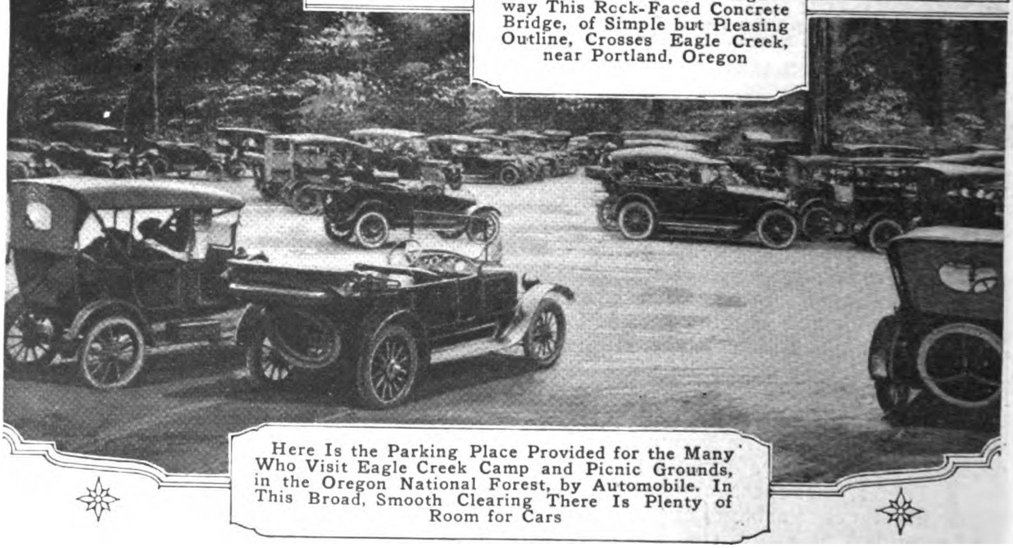
Eagle Creek Trail Itself Has Some Adventurous Spots, Like This One, Where the Rock Overhangs the Trail on One Side and Drops Away in a Broken Precipice on the Other



At Eagle Creek Camp and Picnic Grounds There Is a Forest Travelers' Register on a Crude Desk against a Tree Trunk. Visitors are Expected to Sign It, and to Read the Bulletins and Make Use of the Chart

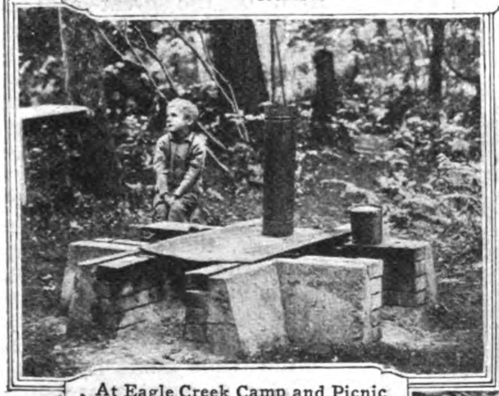


On the Columbia River Highway This Rock-Faced Concrete Bridge, of Simple but Pleasing Outline, Crosses Eagle Creek, near Portland, Oregon

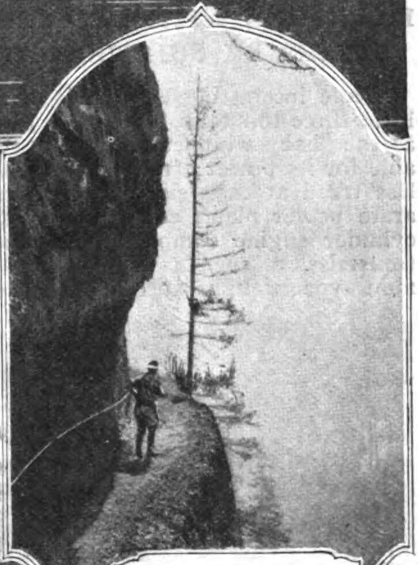


Here Is the Parking Place Provided for the Many Who Visit Eagle Creek Camp and Picnic Grounds, in the Oregon National Forest, by Automobile. In This Broad, Smooth Clearing There Is Plenty of Room for Cars

Wahtun Lake, at the End of Eagle Creek Trail in the Oregon National Forest, Has a Magic Quality That Makes These Portland Boy Scouts, Swimming in Its Quiet Waters, Look Like Nereids



At Eagle Creek Camp and Picnic Grounds Are Several Dozen of These Concrete Camp Stoves, Lined with Fire Brick, for the Convenience of Visitors



Eagle Creek Trail was Cut from the Face of the Rock at This Point, and Is Really Little More Than a Notch in the Precipice, with a Handrail to Make the Traveler Feel Easier

Tables and Benches, Such as This Picnic Party is Using, are Supplied by the Forest Service, and are to be Found Located in Suitable Places about the Eagle Creek Camping Grounds. Sojourners in Oregon National Forest Are Always Free to Make Use of Them

The grounds are in charge of a forest ranger who protects them from fire and assists parties in finding satisfactory camping places.

From the picnic grounds, a scenic trail has been constructed up Eagle Creek Cañon for 15 miles at a cost of $1,000 a mile. Long stretches of this trail are carved out of the solid rock, and in several places the builders were compelled to work suspended on life lines.

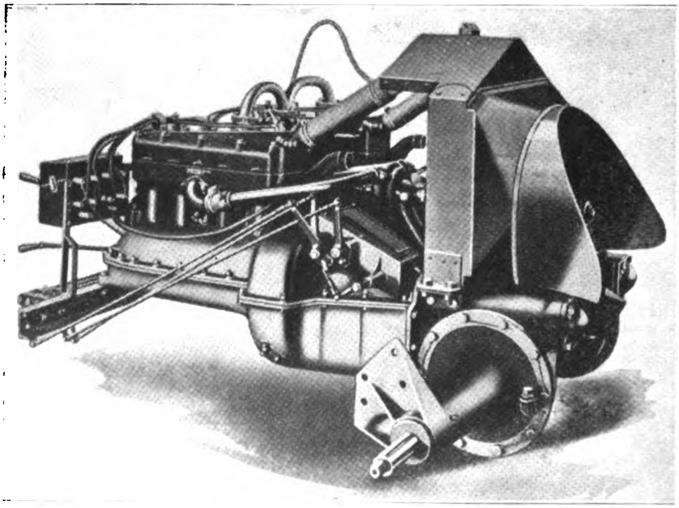
Two bridges, one a hundred feet above the water at the head of a box cañon, and the other a long bridge near the stream, carry the trail across the creek. A third crossing is made by passing the trail through a 30-ft. tunnel behind a waterfall, 150 ft. high. Late last autumn the trail was completed to Wahtun Lake, where the Portland Boy Scouts of America have established a summer camp.

Waterfalls, cañons, cliffs, and big timber abound along the trail, while native wild flowers and rare ferns lure the traveler.

It is safe to say that miles of motion and still-picture film have been exposed along Eagle Creek Trail by tourists in their efforts to carry some of its wonders away with them.

BABY TANK WITH TWO ENGINES STEERS BY SHIFTING GEARS

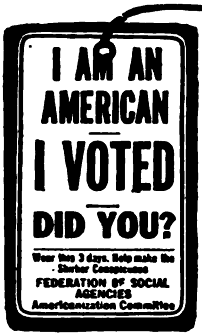
While interesting enough in itself, the little three-ton tank, known in the army as the "baby whippet," is chiefly remarkable for its power arrangement. The endless tread at each side has its own separate power plant, consisting of a four-cylinder engine complete with planetary transmission, such as is used in a common type of light automobile. To synchronize the engines, however, and preserve a straight course, the engine flywheels are toothed and engage an idle gear wheel mounted between them. Each planetary transmission gives its side two speeds forward, one reverse, neutral, and brake. This takes care of the steering. By running one side forward and the other reverse, the tank will turn around where it stands. Reduction from the power plants to the truck-driving sprockets is by worm gear.



This Power Plant for Baby Tanks Consists of Two Complete Engines with Planetary Transmissions, Connected by an Idle Gear. The Transmissions Handle the Steering

FIRST STAGE IN RESTORATION OF ST. PAUL'S FINISHED

The restoration of the great central dome of St. Paul's Cathedral in London has progressed unremittingly for five years, proving quite as difficult as work on the transept mentioned in Popular Mechanics Magazine for December, 1917; but it is now reported that one primary stage, the strengthening of the southwest pier, has been completed. The most careful precautions have been necessary, as the triple dome is calculated to exert a pressure of 8,000 tons on each of the 200-year-old piers, making any serious withdrawal of support quite dangerous. Among several interesting discoveries made during the progress of the work, it was found that many of the capitals that crowned the columns were only poor copies, so insecurely cramped and doweled to the stonework that a light touch sent them to the ground. It was learned too, that, despite the boast of Sir Christopher Wren that he "built for eternity," the pier fillings were so unsatisfactory that much solidifying with liquid grout was necessary.



First Papers Taken Out
I am going to be AN AMERICAN

PROGRESSIVE CITY WILL BE ALL AMERICAN

By PAUL JENKINS

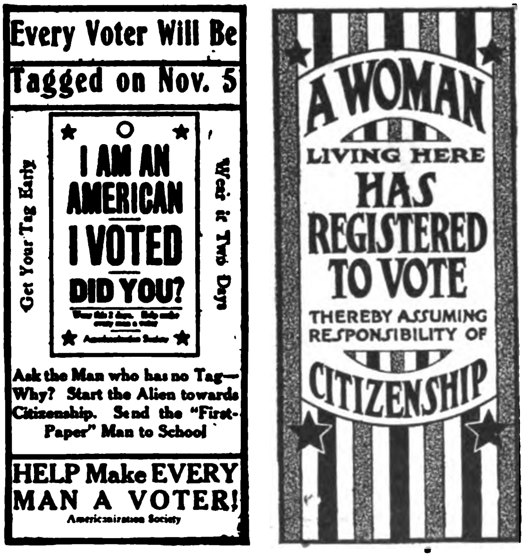
THE present world-wide dissatisfaction with the old order, and yearning for a new, has been capitalized and organized with occasional alarming success by the forces of disintegration. But in America the friends of law and order have at length recognized a potential good in this unrest; have realized that many Americans are simply ignorant that our constitution puts deliverance in our own hands. Widespread campaigns of education in the first principles of representative government testify to a recognition of this dangerous ignorance and apathy.

In one American city this constructive work is in the hands of an enterprising body well named the "Americanization Society." Realizing that individual interest is the very keystone of the American political arch, the society makes "Every Voter at Every Election" its task, with "Citizenship for Every Alien" as a corollary.

Ambitious for the largest proportion of voters in the United States, this local society uses the most modern forms of publicity and advertising in its work. Posters throughout the city tell the people to "Vote — Help Make Your Shops, Offices, and City 100% American," "Start the Alien toward Citizenship; Send the 'First Paper Man' to School," or "Prove Your Willingness to Assume the Duty of Voting." Handbills emphasize the rock-bottom principles of American government, declaring that: "The first absolutely essential step in Americanization is to convince all men that, so long as they live in a democracy and benefit by it, they are morally obliged to take part in it by voting; and if they do not vote, they have no right to live in it." And at the last election every voter was decorated with a tag announcing: "I Am an American. I Voted. Did You?"; while posters about the city advised the patriot to "Ask the Man who has no Tag—Why?"

A previous campaign was directed solely at the feminine nonvoter. Educational pamphlets were handed to her; if she registered she was given an emblem to hang in the window.

Wholesome propaganda of this type is certain to be fruitful. Already, in this city, it is reported that aliens are crowding the offices of the courts for their papers; habitual nonvoters are being brought to light, and to the polls, while every election day is yielding a large vote, in good proportion to the population.



Tags and Newspaper Stories, Posters and Honor Emblems Like These, Make Duty Clear to Citizens and Aliens of One Loyal American Municipality

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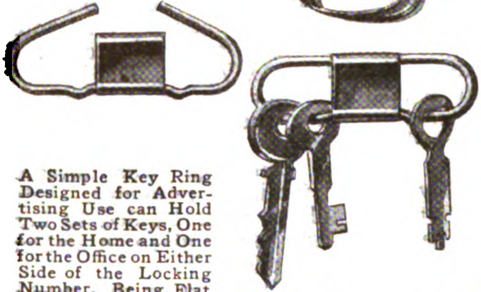
BRICK MACHINE SHAPES TAMPING CLAY

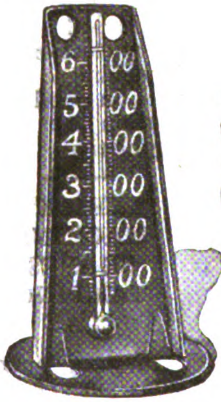
Blasting operations in large mines, where several thousand shots a day are fired, consume quantities of tamping material. At an English mine a brick-making machine has been put to good use for making plugs of plastic clay, which is the best of tamping substances. After a pug mill has mixed the clay, it is pressed through a multiple die having from six to ten 1-in. holes. Cut into pieces, 10 in. long, the plugs are then separately wrapped, and one accompanies each parcel of explosive given to the miners.

SOME NOVEL AND LITTLE-KNOWN ACCESSORIES

A Small Electrically Heated Tray That can be Connected to Any Fixture Is a Convenience in the Sick Room or for General Use in Keeping Dinner Dishes Warm Until Served

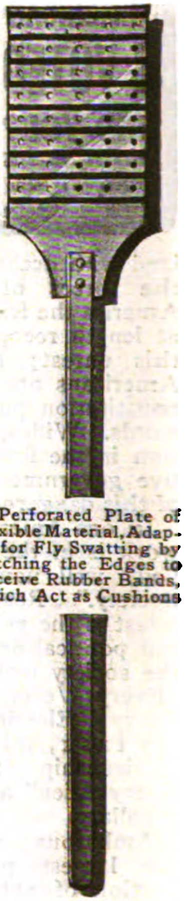


A Simple Key Ring Designed for Advertising Use can Hold Two Sets of Keys, One for the Home and One for the Office on Either Side of the Locking Number. Being Flat and Light, It may Easily be Mailed in an Envelope with Other Advertising Matter

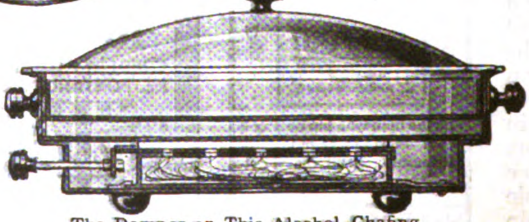


A Sturdy Little Thermometer on the Oven Eliminates Guesswork in the Kitchen and Makes Cooking Easier

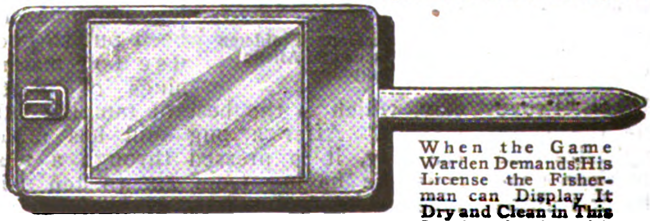
With the Approach of Canning Season the Housewife should be Interested in This Kettle Which Contains an Inner Tray Holding Six or Eight Quart Jars



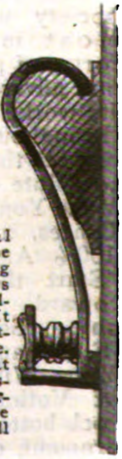
A Perforated Plate of Flexible Material, Adapted for Fly Swatting by Notching the Edges to Receive Rubber Bands, Which Act as Cushions



The Damper on This Alcohol Chafing Dish Makes It Easy to Regulate the Intensity of the Heat. By Closing the Damper the Flame is Extinguished

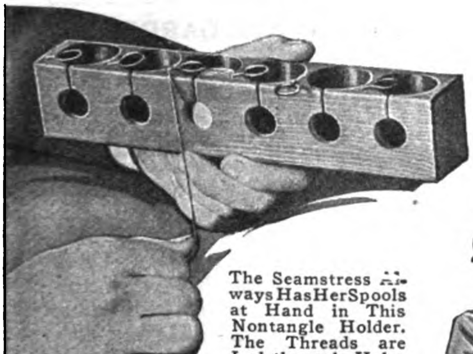


When the Game Warden Demands His License the Fisherman can Display It Dry and Clean in This Leather Armlet with Transparent Window



An Ornamental Hook on the Face of This Molding Hook Conceals Two Grooved Pulleys Which Make It Easy to Straighten a Large Picture. The Small Heel at the Bottom Assures Good Bearing Surface against the Wall

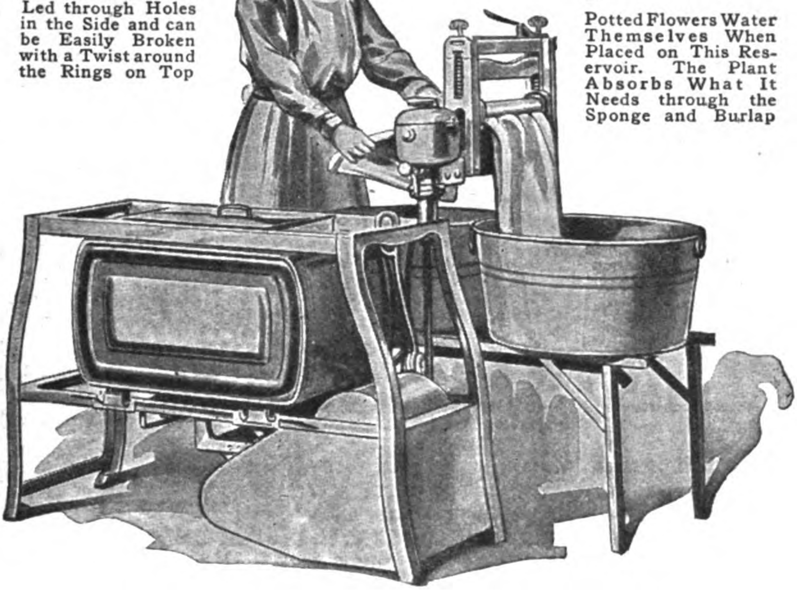
INTENDED FOR THE HOME AND ITS MEMBERS



The Seamstress Always Has Her Spools at Hand in This Nontangle Holder. The Threads are Led through Holes in the Side and can be Easily Broken with a Twist around the Rings on Top

Potted Flowers Water Themselves When Placed on This Reservoir. The Plant Absorbs What It Needs through the Sponge and Burlap

For the Front Vestibule, the Bathroom, or the Cellar Steps, a Small, Inexpensive Gas Mantle Burns Much Less Gas Than the Old Flat-Flame Burner



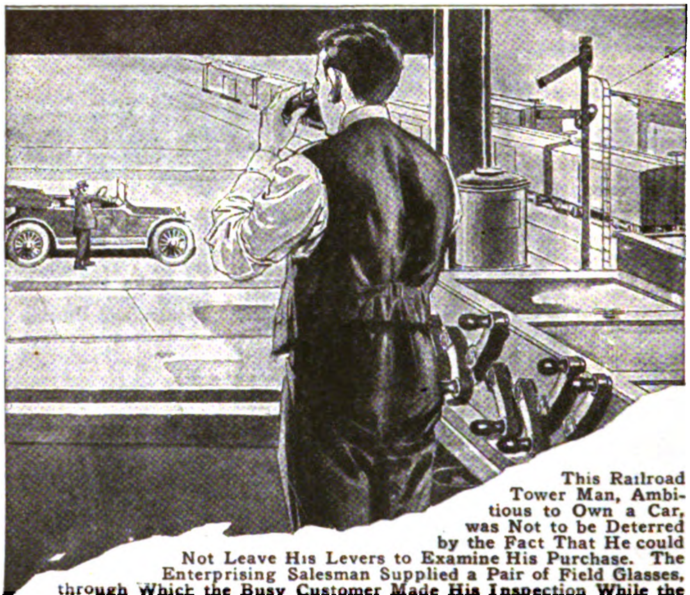
A Gas Heater on This Electric Washing Machine Keeps the Water in the Tub Constantly at the Boiling Point. The Motor-Driven Wringer Does Away with Fatigue, and may be Conveniently Swung to Any Desired Position of the Tubs

This Combined Fancy-Work and Vanity Case Holds Mirror and Purse, and a Ball of Yarn or Thread, Which may be Used through a Hole in the Cover

A Rubber Bathing Cap That Resembles an Airman's Helmet Keeps Water Out of the Ears by Means of Two Reinforced Protecters

FIELD-GLASS VIEW SELLS CAR TO BUSY CUSTOMER

A resourceful automobile salesman recently overcame a seemingly insurmountable obstacle when he encountered a customer too far away from the car to examine it, and too busy to come closer. The buyer was a railroad tower man, who could not leave his levers and signals even for five minutes. The road where the car stood was several hundred feet away. The salesman managed to get a pair of field glasses, and through these the "prospect" inspected the car while the automobile man talked. The sale was made.



This Railroad Tower Man, Ambitious to Own a Car, was Not to be Deterred by the Fact That He could Not Leave His Levers to Examine His Purchase. The Enterprising Salesman Supplied a Pair of Field Glasses, through Which the Busy Customer Made His Inspection While the Persistent Automobile Man Alternately Talked in the Tower and Walked Out to the Road to Point His Moral

CONTROLLER CONTACTS SAVED BY INTERRUPTING CURRENT

Saving controller contacts from damage by arcking is the object of a European inventor. In series with the contacts he connects hot-cathode rectifier tubes, whose heating circuit is broken by the switch arm in advance of the main circuit. The momentary interruption of the current prevents any arc formation.

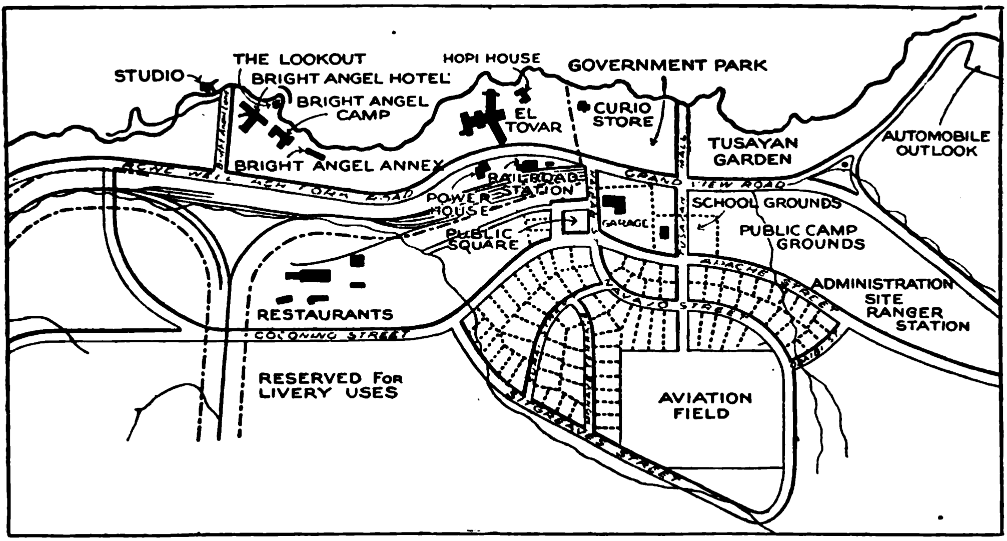
¶An American still holds the world's airplane altitude record with 28,900 ft., as recent rereading of the British claimant's instruments showed a revised height of only 27,000 feet.

COAST-DEFENSE MORTARS IN PRIVATE GARDENS

To the constantly growing story of America's war activities must now be added the report of a government camoufleur who describes his work done on the Atlantic seacoast. Due to government suspicion that U-boats were using a base near Cuba, he says, he was commissioned to camouflage the dirigible hangars and large hydrogen plant near Pensacola, Fla., which he did with such success that the structures were indistinguishable from five miles at sea. Of most interest, however, is his description of the concealment of the heavy coast-defense mortars, some of 12-in. bore, which guarded New York Harbor. The massive concrete emplacements were often placed in private gardens, as much as two and a half miles from the coast, where they were hidden from aerial observation by trailers of "artificial honeysuckle, morning-glory, and ivy," which were changed in color according to the seasons.

NO SLIPPERY CAR STEPS WITH NEW TREAD

The ordinary steel treads used on public stairways, car steps, etc., are an undoubted economy, but they are equally a nuisance to the pedestrian, particularly during wet weather. But this is not the case, it is maintained, with a one-piece, nonslipping tread that is now being marketed. This tread consists of a light iron baseplate which is channeled or punched to receive lead inserts rolled into the plate and securely interlocked. A wearing sur-



Plan of Proposed Improvements to the Village of Grand Canyon, Arizona, Intended to Make It a Fitting Gateway to the Great Scenic Wonder: New Features Are the Public Square, Bright Angel Lane, Government Park, Tusayan Mall and Garden, Automobile Outlook, Public Camp Grounds, and the Future Aviation Field

face is thus presented that is nonslipping in all directions, yet slow in deteriorating, as the iron skeleton lies flush with the lead and hence prevents rapid wear.

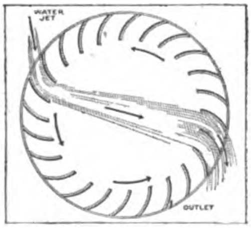
PLANS FOR IDEAL GATEWAY AT RIM OF GRAND CANON

The main point of entry to the Grand Cañon of the Colorado River is a little Arizona village of not more than 400 permanent residents. It is among the plans of the United States Forest Service to make of this community of Grand Canyon, a model town devoted to one purpose: providing for the visiting public in a manner appropriate to the gateway of so vast and awe-inspiring a landscape. The settlement, now almost formless, would be laid out about a central plaza, preserving the standing groves of yellow pine.

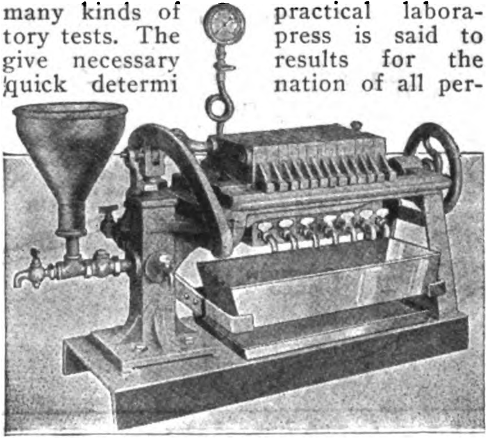
On the brink of the cañon the plan locates Government Park, as the official approach to the rim, leaving for future development a more formal means of introduction to the impressive view. Eastward along the margin lies Tusayan Garden, interesting in prospect for its collection of local flora. Still farther east, where the cañon wall drops sheer 1,000 ft., the automobile visitor is provided with an outlook and parking space. A footpath to Yavapai Point touches the actual rim only occasionally, giving the pedestrian opportunity for emotional recovery between drafts of scenic stimulant. At the point is planned a shelter, invitingly visible from the village. The entrance to Bright Angel Trail is to be dignified by the opening of a 50-ft. strip to be known as Bright Angel Lane. The plan even reserves space for an ultimate airplane-landing field. The village itself, now extraordinarily hampered by lack of organization, its land all government-owned, without water supply or sewerage system, is to have such improvements as the peculiar circumstances allow, and its natural beauties are to be emphasized.

DOUBLE-ACTION WATER WHEEL IS LIGHT AND EFFICIENT

In a water turbine, designed by a Hungarian engineer, the jet passes diametrically through the wheel after working on one side and spends its last energy against the vanes of the other side. The vanes are curved, and the water strikes them at a tangent, just above the horizontal diameter. After shooting across to the opposite side, it is discharged near the bottom of the wheel. The width of the turbine varies according to the power desired. The peripheral speed is between 98 and 164 ft. per second. Laboratory tests of a small model showed efficiency as high as 89 per cent.



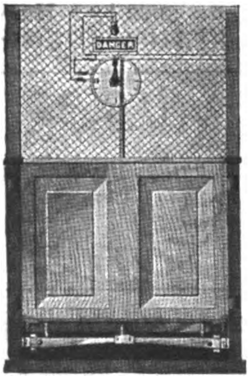
FILTER PRESS FOR QUICK PRACTICAL TESTS



A Filter Press of Possible Value to Many Manufacturing Plants

A compact filter press of a new type enables the chemical engineer to make many kinds of practical laboratory tests. The press is said to give necessary results for the quick determination of all percentages desired in the use of certain materials. Designed with flush-type corrugated surface plates and extension frames, it allows either, or both, cloth or filter paper to be used. The press will stand a working pressure of 150 lb. per square inch. The machine weighs about 180 lb. in either iron or brass.

LIGHT WARNS WHEN ELEVATOR IS OVERCROWDED

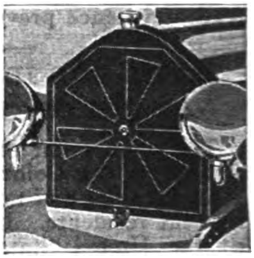


A recent attachment for passenger or freight elevators flashes a red light, or rings an alarm bell, when the car is overcrowded, thus enabling passengers to check overloading in the interest of their own safety. The invention consists primarily of a common platform scale, which supports the passengers, and depresses a vertical rack rod when loaded. This rack is engaged with a pinion, and thus revolves a pointer on a conspicuous, calibrated dial. When the pointer is turned to a predetermined danger point, an electric current is closed which operates the alarm feature.

PERSISTENT EFFORT REVIVES GIRL TEN HOURS IN WATER

The wisdom of continuing resuscitation processes, even after it is apparently hopeless, is strikingly demonstrated by the extraordinary experience of a Guerneville, Calif., school-teacher. She fell into the sea while taking surf pictures, and was washed ashore about 10 hours later. Life apparently was extinct. Nevertheless, her rescuers worked over her for five hours with hot applications, vigorous rubbing, and hot stimulants. She regained consciousness after a total period of insensibility of 15½ hours, and in a short time fully recovered. The fact that she was stunned by her fall evidently saved her from drowning during the long immersion.

ADJUSTABLE RADIATOR COVER KEEPS AUTO ENGINE WARM



Automobile drivers who stick sheets of paper on the front of the radiator to keep the engine from catching cold will welcome an adjustable radiator cover which is as neat in appearance as it is effective in action. It is made of heavy blanket cloth and sheet steel, having six radial openings which are closed, or varied in size, by turning a six-bladed shutter pivoted at the middle. The cover fits perfectly, being made for any type of car.

FRESH SOURCE OF FUEL AVAILABLE

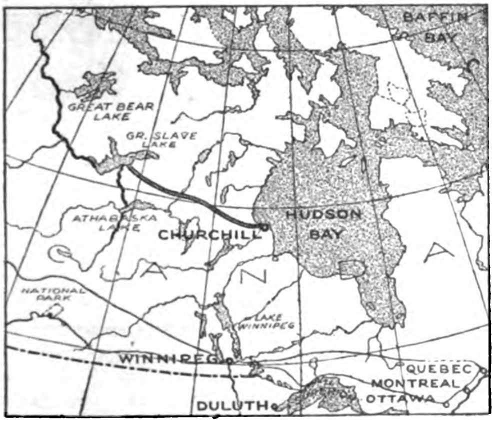
Many attempts to compress into "briquettes," and hence make commercially available, the large accumulations of small coke and coke dust about every gas plant have all failed till recently, because coke lacks completely the bituminous, "tarry" qualities that fit coal dust for this process. Earlier experimenters found it impossible to find a cheap, practicable substitute "binder," and discovered, furthermore, that the open pores of coke absorb water, causing explosion in the furnace and consequent shattering of the briquette. So the problem has been to find a cheap bituminous material that will mix with, and bind, small coke, in addition to filling its pores. And such a material is now reported in actual use at Wittenberg, Germany, being a tarry by-product from the manufacture of oil gas.

ENGLAND'S RICH DISCARD LONDON TOWN HOUSES

For hundreds of years members of England's wealthy class have maintained their splendid town houses in London. But today, with the perfecting of the automobile and the increased convenience of apartment and hotel, there is a growing tendency to break with tradition and maintain only the country home. This fashionable back-to-the-land movement is expected to have royal sanction, too, as the king and queen will use beautiful old Windsor Castle, 25 miles from London, this season, much more than Buckingham Palace, in the city.

PROJECTED RAILWAY WILL TAP NORTHERN CANADA

Northwestern Canada's fur trade, and the prospect of opening up her stores of mineral wealth, have induced a group of capitalists to petition the Canadian government for permission to build a railway that will run east and west from Hudson Bay to Great Slave Lake, about 700 miles north of the American border, and, it is stated, some 400 miles north of any existing line.

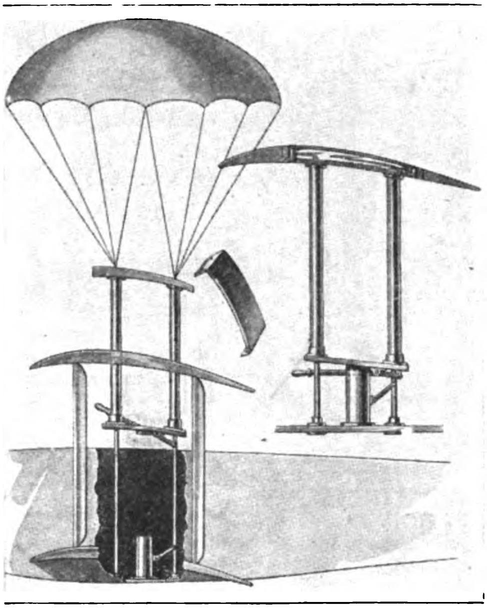


The Unmeasured Riches of Canada's Northwest will be Released by the Far Northern Railway Indicated by the Heavy Parallel Lines

¶Schenectady, N. Y., is honoring its returned war heroes with municipal medals.

EXPLOSION TO EXPEL AIRMAN AND PARACHUTE

His airplane falling out of control, a pilot equipped with this unusual safety arrangement would drop his right hand to a lever beneath his seat. A jerk upward, an explosion—and pilot, his seat, three auxiliary struts, and part of the upper wing would be drifting to earth beneath a parachute. The inventor provides that the parachute be folded inside a tray which forms part of the upper wing, while the expulsive cylinder is placed under the pilot's seat.



Showing How an Inventor would Fold a Parachute within a Tray in Airplane's Upper Wing: An Explosive Charge in the Cylinder Would Expel the Airman and Parachute

FIRST THROUGH TRAIN FOR WOUNDED YANKS

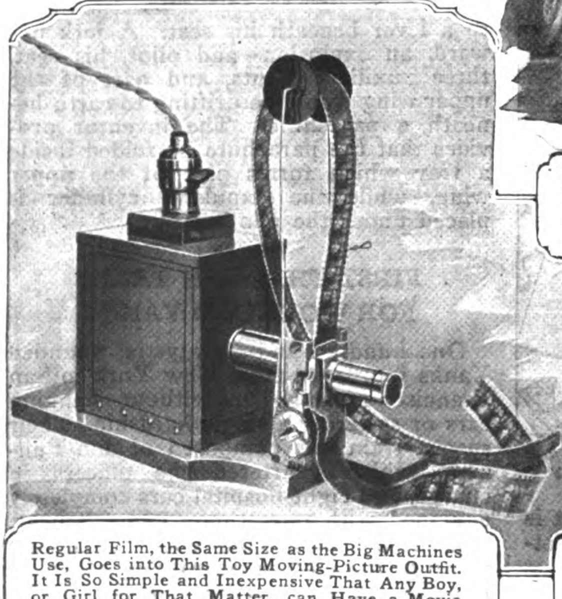
One hundred and twenty-six wounded Yanks journeyed from New York to San Francisco not long ago without changing cars or suffering a single hardship. Their special train was composed of one Pullman, which quartered the officers in charge, and eight hospital cars completely equipped with operating room, kitchens, and wide comfortable cots. Although many of the boys were walking cases, all had their meals served on small tables at their bedsides. Four officers and 25 men accompanied the wounded as attendants.

INTERESTING IDEAS, PICTURES, AND TOYS

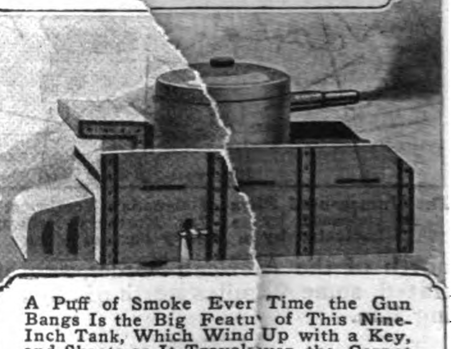
When the City of Portland, Oregon, Distributed 100 Milch Goats among Its School Children, There Was Considerable Excitement about Getting Them Home. This Mother Goat is Willing to Enter a Wagon to Join Her Kid

One Enormous Egg Hatched These Twin Ostrich Chicks. Unfortunately They did Not Live Long, and the People on the Ostrich Farm at South Pasadena, California, Where They were Born, had Them Stuffed

This Little Portland Girl had to Lead Her Goat Home, but They Both Enjoyed It. The Animals were Sold to the Children at Cost, to Encourage Interest in Raising Them



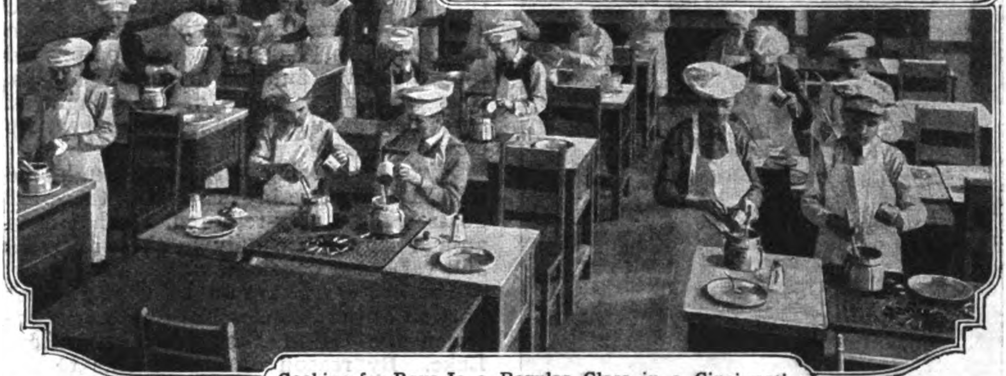
Regular Film, the Same Size as the Big Machines Use, Goes into This Toy Moving-Picture Outfit. It Is So Simple and Inexpensive That Any Boy, or Girl for That Matter, can Have a Movie Show Right in the Parlor



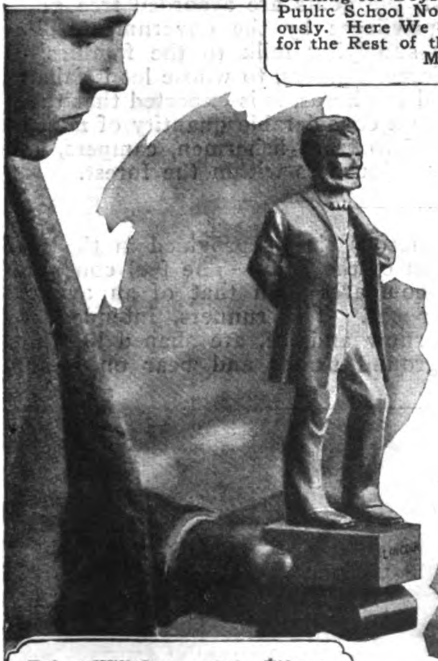
A Puff of Smoke Ever Time the Gun Bangs Is the Big Feature of This Nine-Inch Tank, Which Wind Up with a Key, and Shoots as It Travels over the Carpet Battle Field

FOR BOYS AND GIRLS IN HOME AND SCHOOL

Cincinnati Schoolboys, Doing "Kitchen Police," Find This Duty Rather Pleasant. They are Serving to the Girls the Meal They have Prepared

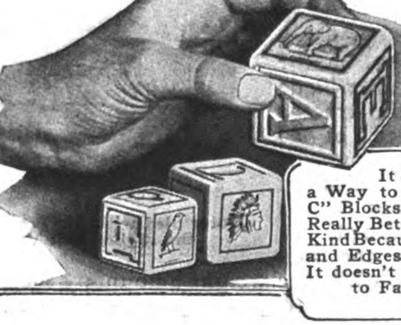


Cooking for Boys Is a Regular Class in a Cincinnati Public School Now, and the Boys Take It Quite Seriously. Here We See Them Cooking the Noonday Meal for the Rest of the School, under the Guidance of a More Experienced Cook



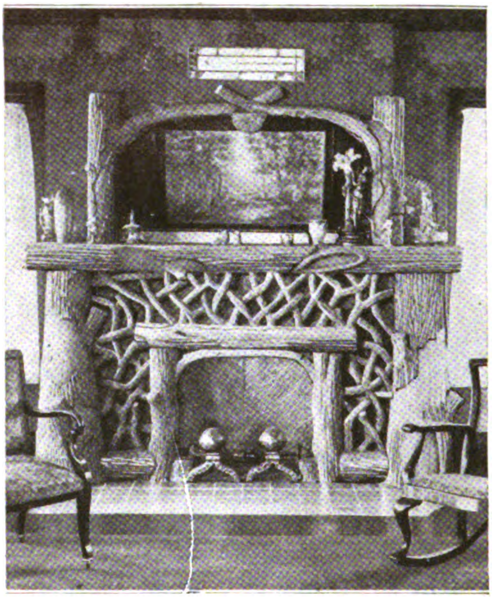
Talent Will Out, and the Fifteen-Year-Old Boy Who Whittled This Statue of Abraham Lincoln Out of a Piece of Driftwood with a Jackknife is Having Some Pleasant Predictions Made about Him. He Lives on a Farm and has Never Studied Art

This Young Fellow has Just Discovered That the Garden Hose Makes a Fine Speaking Tube. It Is Much Better for Play Telephoning Than the Old String and Tin-Can Arrangement, and Works Nicely between Two Back Yards



It Is Hard to Find a Way to Improve "A B C" Blocks, but These Are Really Better Than the Old Kind Because Their Corners and Edges Are Round, and It doesn't Hurt So Much to Fall on Them

GRACEFUL EXAMPLE OF WORK IN ARTIFICIAL STONE



A Cement Worker Cleverly Imitated the Texture and Colors of Nature in This Mantlepiece

A living-room fireplace constructed of logs and twisted limbs would excite interest from its incongruity alone. But the truth is even more curious, as the work was done by a cement worker who specializes in imitation. Cement is the material used, and so naturally and gracefully, that the visitor is tempted to test it with his pocketknife. The texture and colors of nature are reproduced with startling faithfulness.

GOATS GRAZE FIRE BREAKS TO REDUCE FOREST FIRES

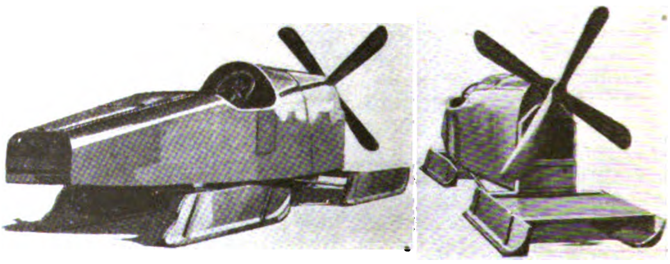
Four hundred milch goats have been procured by the forest administration of the Angeles Forest Reserve and are to be used this summer for lessening the menace of forest fires. This is to be accomplished by grazing the animals in the fire breaks, thus eliminating much of the danger of spreading fires by keeping these barriers clean.

Wires are being strung through the middle of the fire breaks, and to these the goats will be ring-tethered, so that each animal may graze only in the fire break and yet cover considerable ground.

The 400 goats are to be used in that portion of the Angeles Forest Reserve between the Cajon Pass and Great Bear Lake. By reason of the benefits to the forest, the goats are accorded free grazing privileges by the government. Besides supplying milk to the families of the forest rangers, to whose lot it falls to attend the herds, it is expected that there will be a considerable quantity of milk to be sold to trout fishermen, campers, and other sojourners within the forest.

FAST POWER SLED IS BUILT FOR RURAL-MAIL CARRIER

One of the northwestern states boasts a rural postman who covers his route by motor car in summer and by motor sled in winter. Some time ago the carrier had a special snow-and-ice "boat" built to meet his particular needs. The vehicle, with a body similar to that of a light speedster, mounts a 40-hp. motor that turns a four-blade air screw of the tractor type. A speed of 30 miles an hour on soft snow, and 70 miles an hour on smooth ice, is said to be attained. In over-all length the sled measures 16 ft., while the weight amounts to about 950 lb. A storage compartment of generous size is provided in the rear portion of the body. The fuel consumption compares with that of an average motor car. The runners, intended for both snow and ice, are shaped like hollow-ground skates and bear on a surface, 6 in. in width and a little less than 5 ft. in length.



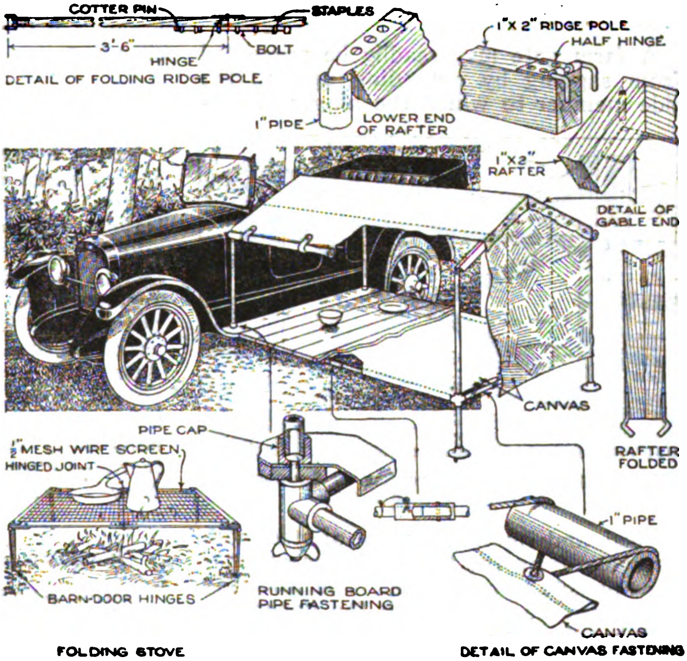
Motor Sled with Air Propeller and Unusually Broad Runners, as Seen at the Right: Left View Indicates Large Storage Space at Rear

Camping by Automobile

By P. P. AVERY

To automobile owners who wish to avoid the uncomfortable hotel with its hot, stuffy rooms, the camping outfit illustrated makes its strongest appeal. It requires only a few minutes to set up camp, and the outdoor meal and sleep may be enjoyed even better than in the usual cramped, inconvenient, permanent camp.

A full-sized, substantial bed is made by fitting lengths of 1-in. pipe together with side-outlet tees, to form a frame 5 by 6½ ft. The pipe need not be screwed tightly into the tees, and can thus be taken apart easily. The two legs at the outer end are screwed into the tees and into floor flanges, which rest on the ground. The height of the legs depends on the height of the running board, to which the other end of the bed is attached by a bolt, as shown in the detail. The awning support is also of 1-in. pipe, with side-outlet tees at the corners. It is supported by short lengths of pipe, which screw into the pipe caps on the running board of the car, and into tees at the outer edge, or foot, of the bed. Sixteen-ounce canvas is used for the mattress, in which wide hems are sewed with very strong seams. The pipes at the side are slipped into the hems. At the ends the mattress is held by stout cords, laced through eyes in the canvas, so that it can be tightened and loosened as required. The awning is 8 or 10-oz. canvas, made like a tent to fit easily over the pipe frame. The sides should be made to roll up and fasten with straps. If these rolls are too long to carry conveniently, the curtains may be cut in two and lapped over when in use.



FOLDING STOVE

DETAIL OF CANVAS FASTENING

Automobile Camping is Made Possible by the Portable Bed, Table, and Grate, Which can be Packed on the Running Board of the Car

Cooking over a camp fire is one of the pleasures of camping, and a good grate will diminish the danger of food falling into the fire. The grate shown in the sketch has a substantial 18 by 24-in. frame of 3/16 by 1¼-in. strap iron, bolted together at the corners. The legs are 12 by 4-in. strap hinges, bolted to the frame. Heavy ½-in. mesh wire screen is riveted to the strap iron for a covering. It is the work of only a few seconds to set up the grate over a fire.

At meal times, the bed is quickly converted into a table. It is only necessary to provide five ⅞-in. boards, 5 ft. 2 in.

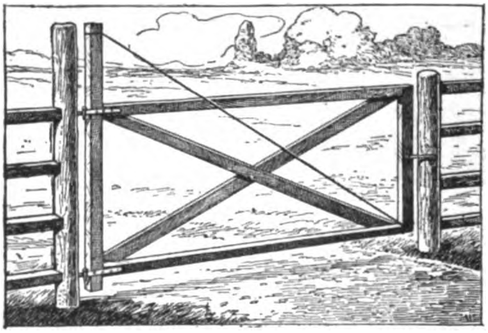
long and 12 in. wide. These are laid across the bed frame; grooves should be cut in the boards where they will rest on the pipes, to keep them from being pushed off endways. The awning flaps roll up out of the way, and the food is protected by the awning above. A camp stool should be provided for each member of the party.

Since all parts of the outfit can be taken down and the pieces stored in very little space, it is possible to fit beds to both sides of the car, and thus provide for a party of four persons. The pipes and boards pack onto the running board, where they are held by stout straps. If the 6½-ft. pipes for the sides of the bed are found to be too long to be carried easily, it is not difficult to cut them in two and telescope the ends into a piece of larger pipe at the joint in the middle, as shown in the detail. This method is much to be preferred to using an ordinary threaded coupling, which makes but a weak joint for such a purpose.

Practically no family which possesses a car need forgo all the pleasures of camping, when the outfit can be so cheaply and easily made. It will pay for itself many times in added health and the pleasure derived.

Gate Braced against Sagging

A farm gate may readily be prevented from sagging by extending upward the side member to which the hinges are attached, and running a piece of steel wire, or cable, from the top of this member to the opposite lower corner. The wire may, of course, be attached to the upper corner, but the fastening as shown places the least strain on the wire brace.—W. Wallace Snyder, Bedford, N. Y.


A Farm Gate That will Not Sag is Supported by a Diagonal Wire Brace

Making Auto Hood Waterproof Protects Coils

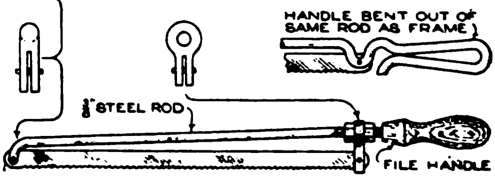
A common trouble experienced by automobile owners, when driving in the rain, is to have water leak down between the coil and dash, and thus short-circuit the terminals of the spark coils. Since the wood of the dash soaks up the water, it often takes a long time to dry the dash sufficiently to get the car started. By forcing a length of heavy, coarse cotton cord between the dash and cowl, and giving it three coats of shellac, allowing this to dry between coats, the leaking is stopped, and the car will not be stalled because of the coil terminals being short-circuited.

Drilling Holes through Cork

When a hole is made in a bottle cork, as, for example, to hold a glass tube, the material crumbles when pierced, and leaves a ragged aperture. A smoother job will be obtained by putting the cork in melted paraffin, and holding it below the surface with a hatpin until all the air pockets are closed up. Move the cork about so that all the air in it may escape. After the cork has been removed and cooled, it can be drilled, cut, or turned in a lathe as easily as soft wood, and yet is sufficiently elastic to stop bottles effectively.—Victor H. Todd, Rainbow Lake, New York.

Hacksaw Frames for Tight Places

Three styles of hacksaws, which can be used where the regular hacksaw frame could not, are shown in the sketch. In each of these the frame is made of ⅜-in. steel rod, bent to shape and slotted to hold the saw blade. Small holes drilled in the side of the slotted portion admit the pins that hold the blade in place. A

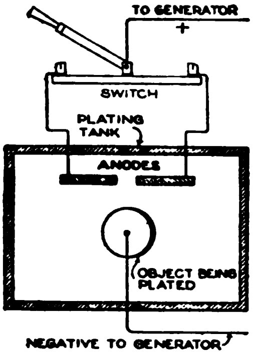


Hacksaw Frames Which Allow the Mechanic to Work in Narrow Places will be Found Useful in Any Shop handle may be put on the end of the steel rod, or the rod itself may be bent to form the handle. Adjustment may be secured by threading the rod and providing a slotted piece to hold the blade. This is adjusted by turning two nuts on the threaded part of the rod, one on either side of the slotted piece.—C. C. Spreen, Detroit, Mich.

Double Anode for Electroplating

When the plating tank is used continuously during the day, it will be found that after a certain short length of time, depending upon the type of work to be done, the speed of plating decreases, without a corresponding increase in the quality of the deposited plate. This condition is brought about by corrosion of the surface of the anode, due to electrochemical action.

A system of double anodes may be used to speed up the plating process, and at the same time greatly improve the quality of the work. Two anodes, insulated electrically from each other, are suspended in the tank. The switch arm is connected to the positive line of the generator, while the two contacts are connected as shown in the sketch. The object to be plated is connected, as usual, to the negative bus bar. After 15 or 20 minutes' plating with one anode, the switch is thrown, disconnecting one anode and diverting the electric current to the other. Meanwhile the acid in the plating bath will dissolve the corrosion on the idle anode, so that it is ready for use when the current is switched back to it.—Kenneth Coggeshall, Webster Groves, Missouri.



Irrigation Water Cools Roof of House

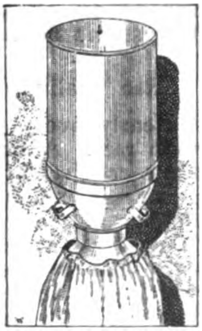
A reduction of temperature of from 15 to 20° in the interior of his home during the hottest summer weather is accomplished, by a California ranchman, by leading the water with which he irrigates an orange grove over the roof of his house before it is taken into the field laterals. The water is spread over the roof by a system of spray pipes along the ridges. It runs down the roof, cooling the house, and is then collected in the gutters to be used for irrigation.

Water to be Used for Irrigation First Performs Another Duty in Cooling the Roof of the House

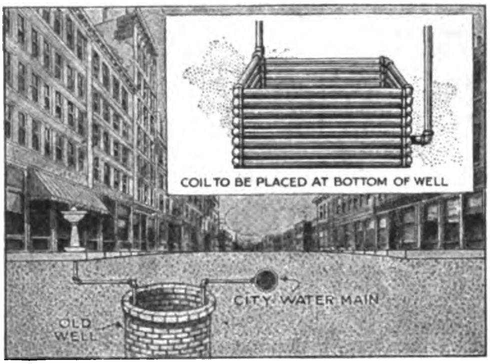
The flow and volume of the water running over the roof is regulated by a valve in the supply pipe, which passes through the kitchen. The amount of water needed for irrigation is always far in excess of that which can be taken over the roof, hence on the hottest days the most thorough cooling is easily attainable. Obviously the fire risk on the property is greatly reduced.—John E. Hogg, Alhambra, Calif.

Milk Can Used for Grain-Bag Holder

An easily made grain-bag holder is shown in the sketch. Secure an old 5 or 10-gal. cream can, and remove the bottom. Then punch a ½-in. hole in the side of the can, near the bottom, and three smaller holes in the neck of the can, spaced equal distances apart around it. Into these three holes, insert belt hooks or hog rings, and clinch them, leaving the hook on the outside of the can. Hang the can on a spike or heavy hook on the wall, or on a post, and fasten the grain bag on the spout by means of the small hooks. The bag is then easily filled. If the holder is to be used with different lengths of bags, it may be hung up by a rope or chain, so as to be quickly adjustable in height.



Old Well Employed to Cool Public Drinking Fountains



The Cold Water in the Old Well, No Longer Considered Fit for Drinking, was Used to Cool the Water Piped to the Drinking Fountain

In many cities which have acquired water systems, there are old wells which have been abandoned and closed. The illustration shows how one of these was used in a western city to cool the water used in a public drinking fountain. The supply pipe for the fountain, instead of running directly from the water main to the base of the fountain, led first to the coil pipe which was placed below the water line in the old well. As the drinking water flowed through the turns of this coil, some of its heat was radiated to the cold water in the well, and, on emerging at the upper end of the coil into the pipe leading to the fountain, it was several degrees cooler than when leaving the water main. The device is especially effective on fountains of the type which are not running continuously, but are turned on by pressing a lever.—C. E. Cory, Fort Scott, Kan.

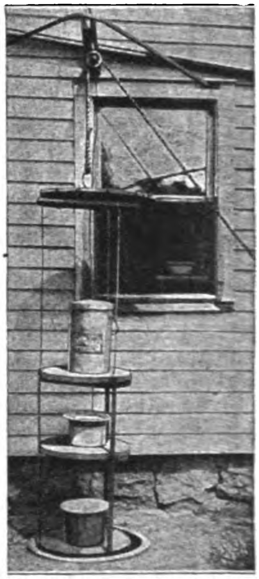
Rat "Hallway" for Poultry Houses

Nearly every poultry man is troubled with rats. A simple device for catching them consists of a rectangular box, 6 in. square at the two open ends, and 30 in. long, with the top either hinged or loose. This serves as an entrance from the outside wall to the henhouse floor, under which it is buried. A steel trap is placed inside it. No attempt is made to conceal the "hallway," but the trap is always kept set and all other entrances are carefully blocked. Sometimes the rats treat the device with suspicion for a while, but they are caught in far larger numbers than by patent traps set with bait.—J. T. Bartlett, Ft. Collins, Col.

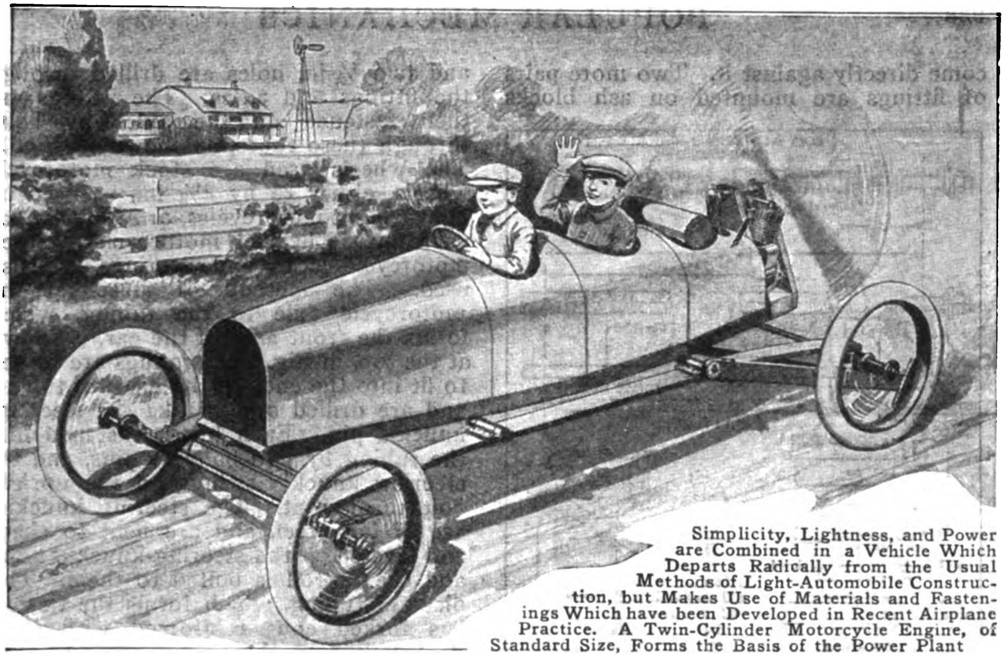
"Running-In" Automobile Engines after Overhauling

The introduction of new pistons, and other parts, into a newly overhauled automobile motor causes the mechanism to run stiff, and makes cranking difficult. The housing of an inclosed flywheel makes it impossible to use a belt with mechanical power for "running-in," and to take care of such cases, a repairman kept an old engine and automobile frame mounted on blocks. He placed the overhauled engine on the same frame, with the two engines back to back, and coupled the yoke of the forward universal joint of one of them to the corresponding yoke on the other. The old engine was then started up, and was run from low speed, through intermediate, and into high, until the engine which had been overhauled ran without undue friction.—S. Vierengel, West Palm Beach, Fla.

Food Kept Cool without Ice



The problem of how to keep food cool without ice was solved for one household in the manner illustrated. A hole was dug in the ground, about 7 ft. deep and 18 in. in diameter, and was lined with sewer tile and provided with a cement bottom. The "refrigerator" consists of several circular shelves slightly smaller than the sewer tile, attached one above the other by steel rods. These hang from a rope which runs over a pulley block, and is coiled on a windlass provided with a ratchet and pawl. Thus the shelves can be raised to any height by winding up the rope, and the food can be removed or inserted. The topmost circular piece, or cover, of the refrigerator is large enough to rest on top of the sewer tile, which should project from the ground far enough so that water will not drain into the well.—Henry J. Wagner, Ashton, Ill.



Simplicity, Lightness, and Power are Combined in a Vehicle Which Departs Radically from the Usual Methods of Light-Automobile Construction, but Makes Use of Materials and Fastenings Which have been Developed in Recent Airplane Practice. A Twin-Cylinder Motorcycle Engine, of Standard Size, Forms the Basis of the Power Plant

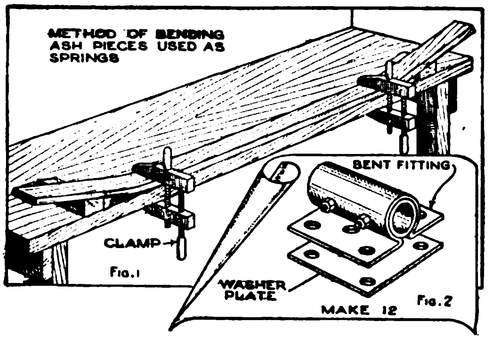
Building an Air-Propelled Speedster

By F. D. BURKE

THE application of the air propeller to road vehicles is a subject which possesses a lure all its own. The air propeller makes possible a vehicle of any power and speed up to the limits of safety on the road, without the complications of clutch, gear shift, and differential. Many persons have the impression that an air propeller cannot move a very heavy vehicle. This is erroneous; very heavy motor trucks have been moved at a good rate of speed by the thrust of air propellers. It is true that the air propeller does not provide much increase of the driving force at low speed; in fact, for this very reason, air-propelled vehicles cannot be expected to compete with gear-driven ones for hill climbing. It is on fairly good roads, in more level country, that the air propeller shows to the best advantage, giving real power at good speeds, without gears to wear out, or any complicated transmission mechanism. The speedster here described is not intended for use on city streets; first, because it cannot claim to have a good "get-away" for city-traffic running, and second, because the air propeller is dangerous where persons might be struck by it.

Chassis Springs

As will be seen in the illustration above, the car is built on two long straight-grain pieces of white ash, which have their ends bent down at least 6 in. by being steamed and held in a form. The method of bending is shown in Fig. 1. The wood should first be steamed or soaked in hot water, and then allowed to dry thoroughly before removing from the bending form. The axles and body are fitted to these springs by 12 bent fittings, all identical in shape and size, made of sheet steel bent around tubing to make a snug fit, as shown in Fig. 2. Two of them are bolted to the underside of each spring, one at each end. The washer plate is used, in each case, on the opposite side of the board, and the bolt heads



The Springs are Steamed and Bent, Using Ordinary Wooden Clamps. Twelve Identical Steel Fittings are Required for Fastening the Body, Springs, and Axles come directly against it. Two more pairs of fittings are mounted on ash blocks bolted to the springs, as shown in the assembly view, Fig. 4.

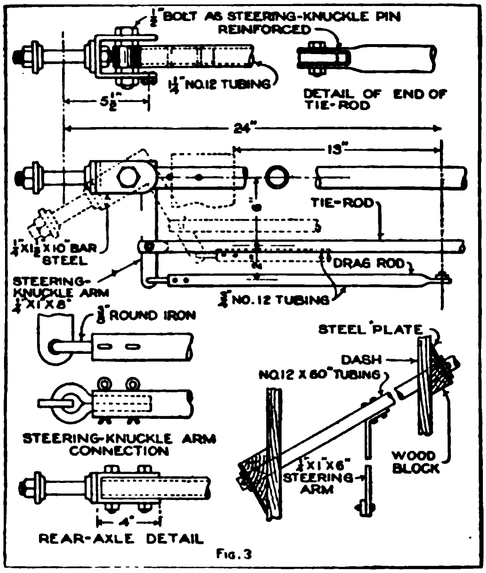
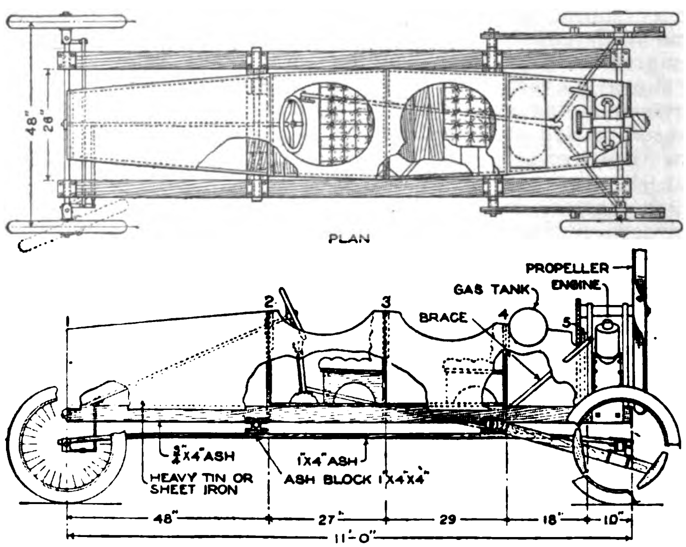


Fig. 3

The Axle and Steering-Gear Construction is Marked by Simple and Vibration-Proof Fastenings Throughout

Axles and Wheels

The front and rear axles are made of the same size of steel tubing, specified in Fig. 3. The ash springs are spaced the proper distance apart, as given in Fig. 4, and two ¼-in. holes are drilled through the fittings and axles. The fittings are then fastened on the axles by bolts through these tubes, as shown in Fig. 2. The wheels used are stock motorcycle wheels, either 26 by 2½ in., as used on light-weight motorcycles, or 28 by 3 in., as used on the heavier motorcycles. Stock motorcycle axles and bearings are also used. The method of attaching the motorcycle axle to the tubing, which forms the front axle of the car, is shown at the top, in Fig. 3. Two lugs are forged to fit into the ends of the piece of tubing, and are drilled out to take the steering-knuckle pin. Each lug is fastened into the tubing by two bolts or pins, and the steering knuckle swings on the upright bolt through it. The steering knuckles are of bar steel, and are bent to shape and riveted to the steering-knuckle arms, and the tie-rod is bolted to them. This piece of tubing, which forms the tie-rod, has forked ends reinforced with sheet steel, bolted to the two steering-knuckle arms; as shown in the detail. The reinforcement consists of No. 12 gauge sheet steel, bent to a U-shape and soldered between the forks of the tube. One of the holes in the tie-rod should not be located finally until the chassis is set up, and the front wheels are tested to see whether they are lined up properly. When they are set parallel with each other, the tie-rod should be marked and drilled. A shorter length of tubing of the same size forms the drag rod, placed behind the tie-rod. One end of the drag rod is attached to the left steering-knuckle arm by a piece of ⅜-in. round iron, forged to a shape resembling a cotter pin, driven into the drag rod, and secured with cotter pins. The other end is flattened and drilled, and is connected to the arm on the steering column. The rear-axle detail, shown below, is, of course, much simpler.



PLAN

SIDE VIEW

Fig 4

In the Plan and Elevation of the Speedster are Shown the Long Ash Chassis Springs, the Brake Linkage, and the Steering Mechanism

Body

The framework of the body consists of five built-up formers, cut from ¾-in. hard pine to the shape and dimensions given in Fig. 5, and mounted on two long ash frame members. Each former is made up of four or five pieces, held together by screws. The formers are held in place between the frame members by wood screws, and are reinforced by hardwood corner blocks. Two cross members are set in the underside of the frame members, as shown in Fig. 4. To each of these, near the ends, are bolted two of the 12 bent fittings. The washer plates used here should be of such length that they can be bent to a right angle, the bent portion to lie against the frame member and be bolted to it. The floor is made of ½-in. boards, screwed firmly to the top of the long frame members. On the underside of the floor, several ¾-in. boards should be screwed diagonally to the floor in such a way that they will strengthen the framework against shocks which would tend to make the frame collapse or fold up. Two light bucket seats, as used on speedster automobiles, will do very nicely. If these cannot be picked up cheaply in some garage, a satisfactory seat can be made from wood and canvas. The tops of the cushions should come about 8 in. above the floor.

The entire body of the speedster is covered with heavy-gauge tin (about XX), or No. 22 gauge sheet steel. It is put on in four sections, of the shape and dimensions given in Fig. 6. If the builder is unable to secure material in such large sheets, sections can be made of two or more pieces riveted together. The metal is bent over and attached to the formers and the frame with roundhead wood screws, spaced about 2 in. apart. The fuel tank is mounted in this metal covering, just behind the rear seat. A metal tank, about 8 in. in diameter and 20 in. long will be suitable. The tank may be soldered tightly at one end to the metal covering, and the other end left loose, so that stresses due to the springing of the car frame will not be transmitted to the walls of the tank.

The body is mounted on the springs by means of two steel tubes, set under the cross members, as seen in Fig. 4. These tubes are bolted into the fittings on the body, and are held in place in the fittings on the springs by heavy cotter pins with washers, placed through their ends. These pins keep the tube from sliding endwise, but do not prevent the slight rotating motion which occurs whenever the springs bend. The rear tube extends out beyond the front one, and serves to anchor the brake bars, outside of which are similar washers and pins.

Steering Gear

As will be seen in the assembly, Fig. 4, and in the detail in the lower right-hand corner of Fig. 3, the steering column is a length of steel tubing, running from the second former, or dash, to the first former, or false radiator. Near the lower end is riveted a steel arm, the other end of which is bolted to the right end of the drag rod, in Fig. 3. At the ends of the steering column, two beveled hardwood blocks are fastened to the formers with wood screws. The tube is held in position lengthwise by cotter pins bearing against large washers.

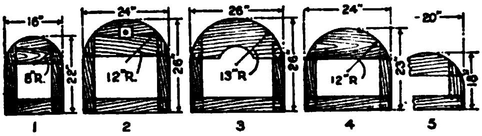
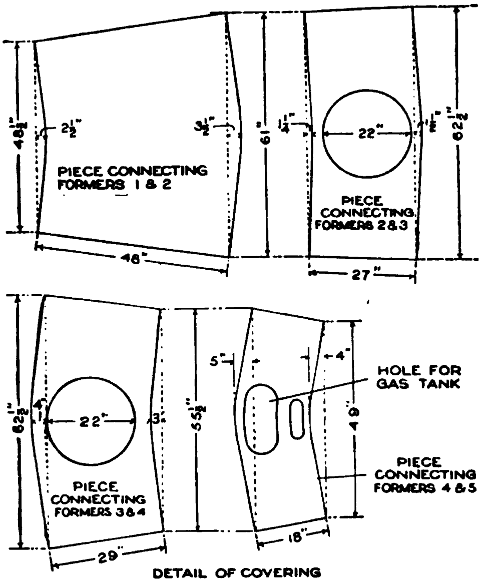


Fig. 5 DETAIL OF FORMERS

The Framework for the Body Consists of Five Built-Up Frames Which Give the Form to the Sheet-Metal Body Covering

Brakes

The installation of a brake on a vehicle of this type is not an easy problem, owing to the fact that there is no rear-axle shaft which turns with the wheels, and the motorcycle wheels used are not built to take a suitable brake drum. It is, of course, possible to mount drums on the rear



48½"
2½"
3½"
PIECE CONNECTING FORMERS 1 & 2
48"
61"
1¼"
22"
1½"
62½"
PIECE CONNECTING FORMERS 2&3
27"
62½"
4"
22"
3"
PIECE CONNECTING FORMERS 3&4
29"
55½"
5"
4"
HOLE FOR GAS TANK
49"
PIECE CONNECTING FORMERS 4 & 5
18"

DETAIL OF COVERING

Fig. 6

Flat Patterns are Here Worked Out for the Four Pieces of Sheet Steel, or Heavy Tin, Required to Form the Body Covering wheels, but it is believed that the brake mechanism illustrated in Figs. 4 and 7 will be easier to construct throughout, and will give satisfactory service. Two brake bars, of ½ by 2 in. ash, seen in Fig. 7, have a 1¼-in. hole in one end, and are slipped over the end of the rear cross tube. The bars are strengthened by iron straps around this end, and the 1¼-in. holes must be slightly elongated to give some end play, so that the brake bar is free to move slightly endwise as the springs bend, but cannot work entirely loose from the ash spring. The brake bars are attached firmly to the rear axle by steel straps, as shown in Fig. 4 and detailed in Fig. 7. The straps must be able to slide along the axle for a distance of ½ to 1 in., depending on how much play is allowed in the brake linkage. To a point directly underneath the rear axle, on the brake bars, the toggle arms are attached by steel hinges. The other end of each toggle arm is attached, as shown in Fig. 7, to the central brake rod, which extends forward to the brake lever in front of the driver's seat. This rod should slide back and forth, guided by an iron strap hung over the tube which is under the rear seat. The brake control lever, seen in Fig. 4, may be placed slightly to one side, and must be provided with some sort of ratchet or locking mechanism, as indicated.

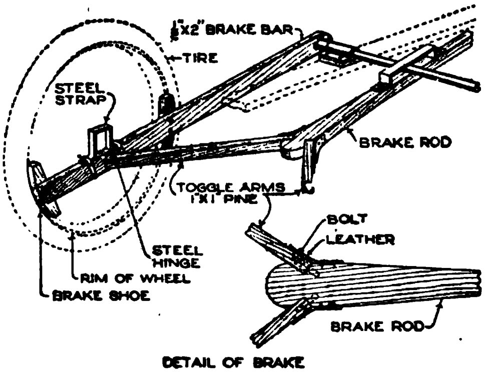


Fig. 7

The Brake Linkage, While of Somewhat Unusual Construction, Equalizes the Pressure on All Four Brake Shoes

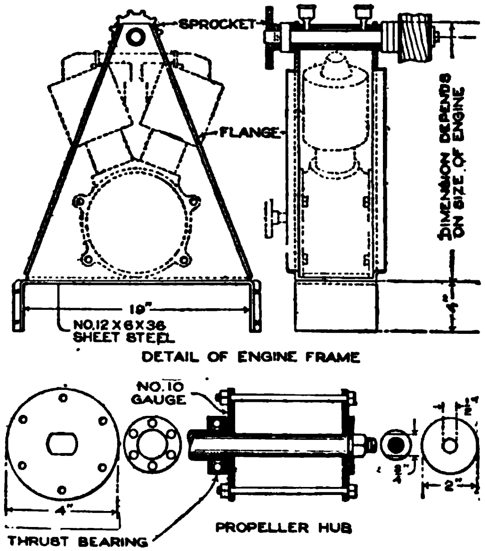


Fig. 8

The Engine Mounting is Not Worked Out in Detail, Owing to Differences in Engine Dimensions, but the Propeller Mounting is Detailed Fully

When the lever is pulled back, the toggle arms force the brake bar, which carries the brake shoes, against the edges of the steel rims on the rear wheels. The brake shoes should be lined with a good grade of automobile brake lining, and the shoes should be at least 6 in. long, to avoid excessive wear on the lining. The lining should be attached in the usual manner with copper rivets, and can be renewed by removing the straps from the rear axle.

Power Plant

A strip of sheet steel is laid across the rear end of the frame members, and lines are scraped on it along the outer edges of these members. The ends of the strip are bent down at right angles on these lines. This strip then forms the base of the engine mounting, which is detailed in Fig. 8. From a piece of the same sheet steel, the upper half of the engine mounting is bent to the form indicated. No dimensions are given for this piece, as they will be governed by the dimensions of the engine. The width between the front and rear triangular faces should correspond to the thickness of the crank case. The metal should be cut away, to allow clearance for any projections on the crank case. The engine is bolted down between the two triangular faces of the steel plate, the bolts being run through the same holes used in mounting the engine in the motorcycle frame.

The propeller is mounted on a piece of 1-in. shafting, which runs in two babbitt-lined bronze bearings set in a tube of suitable size, as indicated in Fig. 8. Holes are cut through the upper ends of the triangular steel faces, just large enough to drive the two bushings through. A short length of tubing is fitted between the flanges, in line with these holes, which, in turn, should be accurately in line with the direction of travel of the car. The bushings are forced through the flanges into the ends of the tube, and fastened with machine screws. A large motorcycle sprocket is pinned, or keyed, to the forward end of the propeller shaft, and a smaller sprocket opposite on the crankshaft of the engine. The chain used is a stock motorcycle chain, shortened as required. Two flat surfaces are filed on the rear end of the shaft, as shown, to take the two disks, as detailed, which are mounted to form the hub of the propeller. A 1-in. thrust bearing is used between the propeller and the rear bushing, to take up the thrust.

The propeller used should be 4 ft. long and of 4-ft. pitch, with a maximum blade width of 6 in. It should be firmly bolted between the two steel disks, and mounted on the flattened portion of the shaft. To strengthen the power-plant mounting against the propeller thrust, it will be well to run two braces of light steel tubing from the flanges of the triangular steel faces down to the ash cross member under the rear seat.

Other Controls

Since there are no clutch and gear shift, the only other controls necessary are the spark advance and throttle on the engine. No attempt is here made to suggest the mechanism for these controls, since it will depend largely on the preference of the builder, and the type of motorcycle engine used. Two wires, from levers on the dash, or pedals on the floor, to the carburetor and the magneto, respectively, will largely take care of this feature.

Operation

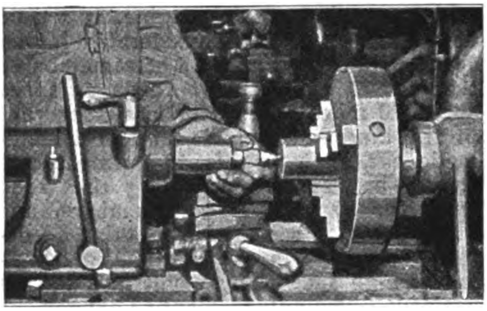
Assuming that the engine makes upward of 2,500 r. p. m., the gear ratio should be 1½ to 1; that is, the sprocket on the crankshaft should have just two-thirds as many teeth as the larger sprocket on the propeller shaft. The speed which can be expected from the car on a good road will depend on the workmanship of the propeller, as well as on the power of the engine, and the weight carried in the car, but it should not be less than 30 miles an hour, if the car is well built, and, with a good powerful engine, it should be possible to get a considerably higher speed than this. It should be remembered that travel on ordinary roads at speed above 30 miles is more or less dangerous in any kind of a vehicle, and in a handmade car, such as this, the utmost care should be used in inspecting the wood used for springs, frame members, and other parts, to see that it contains no defects, as failure in one of them in traveling at high speed may result in a serious accident. The only element of danger due to the air-drive system is that some person may come in contact with the propeller while it is in motion. The mounting of the propeller between the rear wheels so that it does not project beyond them minimizes this danger, but care should be used when turning the propeller to start the engine to see that nobody is in a position to be struck by it. In starting the engine, set the brake firmly, retard the spark, open the throttle only a small amount, and give the propeller a turn or two with the hand. It is important that the throttle be not opened wide in starting, as the driving thrust is exerted immediately when the engine starts, instead of being delayed until the clutch is engaged, as in an ordinary car. It is for this reason that the brake must be firmly set, in order to hold the car from starting under the initial thrust from the propeller. Unless the throttle is open too wide, this thrust will be easily held by the brake. The driver then takes his seat and releases the brake, opening the throttle farther, if necessary, to start the car. Accessories, such as a horn, speedometer, etc., may be added as desired.

MATERIAL REQUIRED

2 pieces of ash, 1 by 4 in. by 11 ft.
2 pieces of ash, ¾ by 4 in. by 11 ft.
2 pieces of ash, 1 by 4 by 40 in.
2 pieces of pine, ¾ by 8 in. by 6 ft.
2 pieces of pine, ¾ by 3 in. by 8 ft.
1 piece of pine, ¾ by 4 in. by 10 ft.
10 sq. ft. No. 12 gauge sheet metal.
45 sq. ft. No. 22 gauge sheet steel, or heavy-gauge tin, body covering.
1 sq. ft. No. 10 gauge tin, body covering.
1 piece No. 12 gauge seamless steel tubing, 35 in. long, 1¼ in. outside diameter.
3 pieces No. 12 gauge seamless steel tubing, 40 in. long, 1¼ in. outside diameter.
1 piece No. 12 gauge seamless steel tubing, 70 in. long, ¾ in. outside diameter.
1 piece No. 12 gauge seamless steel tubing, 60 in. long, outside diameter depending upon steering wheel used.
4 ft. bar steel, ¼ by 1½ in.
3 ft. bar steel, ¼ by 1 in.
1 pair bronze bushings, 1 in. inside diameter.
1 1-in. thrust bearing.
1 piece shafting, 1 by 14 in.
4 front motorcycle wheels, complete with bearings and axles, light-weight or standard.
1 light-weight automobile steering wheel.
2 light bucket seats.
Several light pieces of hard pine for brake linkage.

Centering Chuck Jobs Quickly in the Lathe

Lathe work held in a chuck may have a center hole drilled without removing the dead center from the lathe. Using a drill chuck as it comes from the manufacturer, countersink it to a 60° angle, so that it will fit directly over the dead center. Place a center drill in the chuck, hold the latter in place with the left hand, and with the right hand bring the tailstock spindle up until the center hole is drilled as desired.—J. J. McIntyre, Bridgeport, Conn.



By Countersinking a Chuck to Fit over the Tailstock Center, a Center Hole is Drilled Very Quickly

Frauds Practiced in Selling Used Automobiles

Weird and devious are the business methods used by many used-car dealers, as well as by individuals who wish to dispose of decrepit automobiles. Camouflage, highly deceptive to the uninitiated automobile buyer, conceals broken and defective parts in the wares which are sometimes offered to the unsuspecting public, and there are times when even would-be experts are deceived.

When purchasing an automobile from a person who is not known to the buyer as being thoroughly reliable in his transactions, it is well to open the transmission case and examine the lubricant within; if it contains small particles of matter, examine still closer, and ascertain whether or not granulated cork has been introduced. Ground cork, such as used for packing grapes, is the old-time tonic for worn and noisy gears. It is needless to say that gears found "lubricated" with cork should be thoroughly inspected.

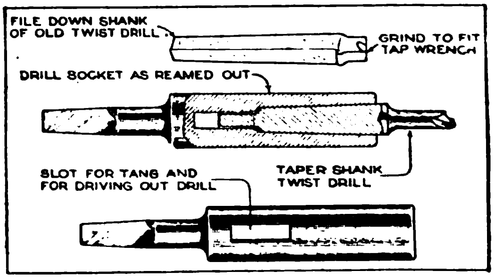
In cars where the compression is bad, castor oil seems to be the most popular demonstrator's aid. This is poured into the carburetor, and is difficult of detection once it enters the cylinders. Cars which are hardly able to pull themselves along in their normal state will, when treated with castor oil, go chugging down the road as if they had just been thoroughly overhauled. The oil forms a sort of gum under the heat of the motor, and temporarily seals the leaks around the piston and piston rings.

Another common stimulant is the use of ether or camphor in the gasoline. Many an unsuspecting motorist has wondered why he could not get the power from his motor as did the man who demonstrated the car. The "poor grade of gasoline used," is the explanation used to comfort such purchasers, and it should arouse suspicion whenever made. The practices cited above are only a few of the many, too numerous to mention. The best way to buy a used car is to buy from a person or firm who can be relied on, for personal or for business reasons, not to employ fraudulent methods.

Making Sockets for Taper-Shank Twist Drills

It is often necessary in the machine shop to make sockets for standard taper-shank twist drills, as when these drills are to be used in a bit brace. The principal job in making such a socket is to ream it out to the proper taper. Unless a reamer of the correct size and taper is at hand, it is necessary also to make the reamer. An easy way of doing this is here described.

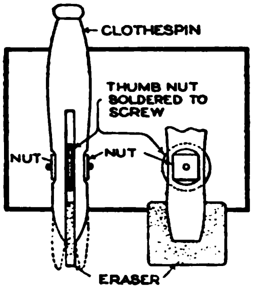
The material used for the reamer is the shank of a broken drill, which is of the same size as those to be used in the socket. Cut off the tang of this drill shank, square the remaining part of the drill, above the shank, to fit a tap wrench, then dress down the shank to a square taper. This is done by filing four flats the entire length of the shank, until they meet and form sharp edges. It is important in filing these flats that the diagonal


FILE DOWN SHANK OF OLD TWIST DRILL
GRIND TO FIT TAP WRENCH
DRILL SOCKET AS REAMED OUT
SLOT FOR TANG AND FOR DRIVING OUT DRILL
TAPER SHANK TWIST DRILL

A Bit-Brace Socket, to Take Taper-Shank Drills, is Easily Machined by First Making a Special Reamer of the square, at any point in the taper, should be the same as the former diameter of the round shank; that is, one must file until the edges become sharp, and must then stop without further reducing the thickness. The square reamer thus formed is tempered to a good full-brown color, and is then ready for use.

The socket is made by turning and filing a piece of steel shafting to the shape illustrated, then drilling, in the lathe, a hole, which is afterward reamed in the vise, with this special reamer, to the proper size. The slot for the tang of the drill is cut out by drilling small holes, chipping, and filing. The making of the socket is not at all difficult after the reamer is provided, and the making of the reamer is a very simple process for anyone who can do fairly accurate filing.

A Clothespin Eraser Holder



All draftsmen know the strain on the fingers caused by using a small piece of eraser for a long time. A handle can be made by fastening the eraser between the lips of a clothespin and securing it with a screw, threaded right-hand on one end and left-hand on the other. The thumb nut is fastened with a little solder, after the screw has been placed in position, the outside nuts being threaded right and left-hand, respectively.—Abel Green, New York, New York.

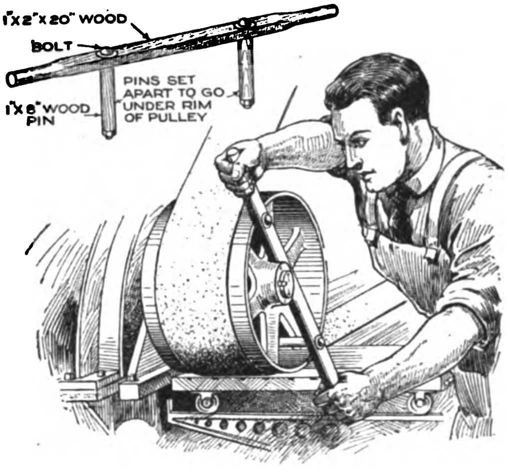
Opener for Crown-Top Bottles

An opener for a crown-top bottle may be made by driving an eight or ten-penny nail into the wall at an angle of about 45°, the head of the nail being lower than the point. To open the bottle, place the neck under the nail, catching the edge of the crown on the nail head. A sharp downward pull will remove the cap instantly.

¶A small electric motor, for which no other use is at hand, can readily be fitted with a chuck on the end of the shaft, forming a chuck motor for driving small screws, drilling, tapping, and the like.

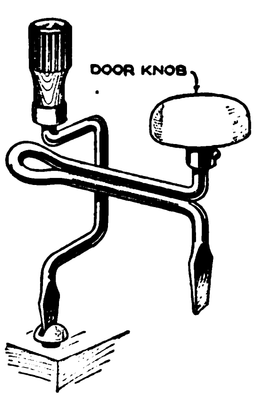
A Tool for Turning Machinery by Hand

A tool, such as illustrated, will be found very handy for the man who frequently has to turn by hand heavy machines, such as the sander shown in the sketch. The tool is made of hard wood, its dimensions depending on the size of the pulleys of the machines to be turned, but the dimensions given will prove suitable in many cases.—E. K. Wehry, Cedar Rapids, Ia.


1"x2"x20" WOOD
BOLT
PINS SET APART TO GO UNDER RIM OF PULLEY
1"x8" WOOD PIN

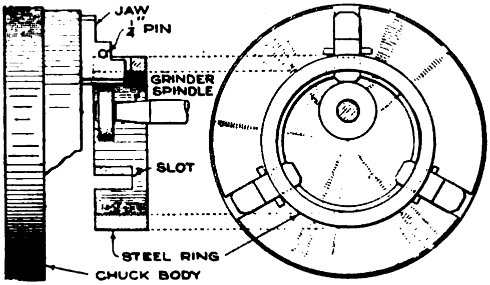
A Lever with Handles at Both Ends Facilitates the Turning by Hand of Pulleys on Heavy Machines

Powerful Screwdrivers



These two cranked screwdrivers are very simple to make. The type shown at the left is made from a standard screwdriver of the long-shank type, the round stock simply being heated and bent to the crank shape. The driver to the right is made of 3/8-in. round steel rod, and the handle is made from a door knob. The first type drives a screw very quickly; the second type is better for forcing home a very tight screw. These tools take up very little room in the tool kit, yet seem indispensable when once used.—C. H. Willey, Concord, N. H.

Grinding Jaws of Lathe Chucks

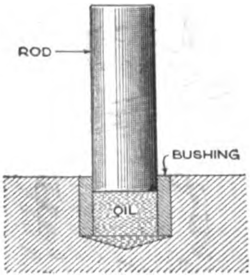


A Steel Ring Fitted over the Jaws of the Universal Chuck Holds Them in Proper Position for Grinding

When the jaws of a lathe chuck of the "universal" type are out of true, they must be resurfaced with a grinding wheel. For this purpose, they should be forced back just as they are when in actual use, all lost motion and play being thus taken up. A good practical way of doing this is shown in the sketch. Through each of the jaws a pin is set, made of 5/16 or 1/4-in. drill rod. A steel ring is then cut out, having slots which fit over the jaws, enabling the ring to press outward against the pins. The ring is placed in position on the jaws, which are then screwed up just as if a piece of work was being gripped in the chuck. The jaws are thus properly held, with their faces clear for grinding.—Chas. Homewood, Ontario, Calif.

Driving Out Tight Bushings by Fluid Pressure

A toolmaker was confronted with the job of removing a bushing which was fitted very tightly in a blind drilled hole. There was not space enough at the bottom of the hole to get in a hook of sufficient strength to pull out the bushing. After several different methods had failed, the toolmaker fitted a steel rod quite accurately into the bushing, filled the hole with heavy oil, inserted the rod and drove it in with a hammer against the oil. The fluid pressure of the oil was transferred to the inner end of the bushing, and forced it out with very little difficulty.



Labor-Saving Chicken Roosts

It has been said that the success of a poultry keeper depends upon the condition of his roosts. There is a good deal of truth in this assertion, yet numerous poultry keepers fail in manure removal mainly because they have inconvenient arrangements. The equipment determines whether this chore is hard or easy. The following are simple plans which save time and trouble.

Assuming that the dropping boards are built up to a wall, as they are in a great majority of poultry houses, two arrangements are successful in operation and easy to introduce. The dropping boards are readjusted so that they are level or have a slight slope toward the wall instead of away from it. Next, wall apertures are made through which the manure is pushed with a hoe into a receptacle outside the house. One method is to make this opening a small manure door, 1 ft. or 18 in. wide and 8 in. high, in which case the outside receptacle may be a barrel equipped with a cover which will shed rain.

Another way is to prepare a wall opening, 4 in. high and as long as the dropping boards, emptying into a special manure box built onto the house. This space is left constantly open, or may be closed by a hinged board. The manure box is as long as the dropping boards, 2 to 3 ft. wide, and as deep as the annual production of manure dictates. It has a sloping roof lid, and the whole is covered tightly with roofing paper, to preserve the manure in a dry state and to keep out draft. It is emptied in the spring, or oftener if desired.

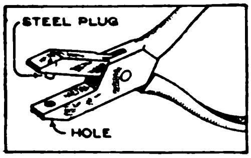
As well-preserved hen manure has a cash value of 75 cents to $1.25 a barrel in many towns and cities, such facilities as the foregoing are profitable investments aside from their convenience. The boards are cleaned with a hoe every day or two, at which time sawdust or dry earth is sprinkled lightly over the boards. The manure does not then adhere, and is readily removed.

In contrast with plans which make daily removal easy are the practical arrangements made for the removal of droppings twice a year, in late fall and early spring. Where floor space is at a premium, as it is with a crowded flock, this method cannot be used. It saves considerable labor, however, and is gaining ground at present among commercial poultry men. The idea is, briefly, to dispense with dropping boards altogether. Beneath the roosts a space equal in area to that ordinarily taken up by dropping boards is set off from the balance of the floor by means of boards built to form a shallow pen. At short intervals in damp weather, and as needed at other times, the poultry keeper sprinkles an inch or so of sawdust or other litter material over this dropping space. If this duty is observed intelligently, no ill-smelling mass will accumulate beneath the roosts. The hens will scratch there, and the mass, steadily growing deeper, will look very much like litter. It is removed with a wheelbarrow twice a year. A concrete floor is preferable for this dropping pen, though in no way indispensable.

Labor, with any style of dropping boards, is very much reduced by systematic applications of sawdust, lime, or other mulch, to prevent adhesion of manure to the boards. A pailful of such material should be kept near at hand, hanging from the side wall, or permanently suspended from a hook beneath the dropping boards.

Punch Made from Old Pliers

A punch for making holes in tin or sheet iron may easily be made from an old pair of pliers. The jaws should be annealed, and holes drilled, as shown in the illustration. A short plug, made of drill rod, is inserted for a perforator, and the jaws are tempered again. The plug should be short, and the hole opposite must be made slightly larger than the plug, to take care of the arc described by the plug when the tool is operated.—Fred Christensen, Columbus, Ohio.

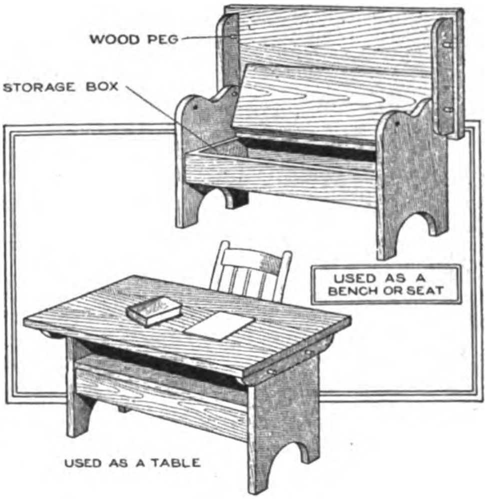


Removing Automobile Valve Cages

Removing overhead-valve cages is often a difficult task. It may be accomplished much easier than ordinarily if a little kerosene is poured into each valve cage before starting work. Then, after removing the rocker arms and valve-chamber plugs, turn the starting crank until the piston begins the compression stroke. Continue to turn the crank very slowly until the compression forces the cage out. This should be done to only one cylinder at a time.—John G. Pope, Worcester, Massachusetts.

A Combination Table and Bench

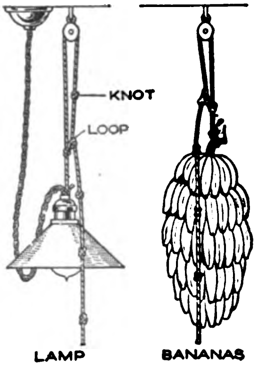
A very useful article of furniture is a table, the top of which is attached in such a way that it can be swung up to form the back of a bench. A shelf underneath the table top then forms the bench seat, and it in turn forms the lid of a box in which magazines or other material may be kept. The pivots on which the table top swings may be wooden pegs, or steel pins, depending on the general type of construction used in building this piece of furniture.



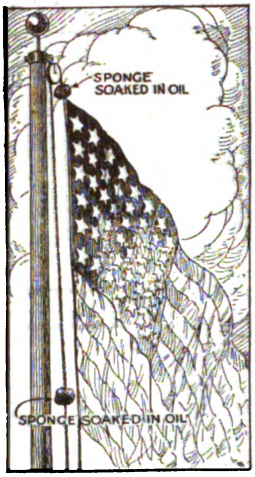
The Same Object Becomes in Turn a Bench, a Table, and a Convenient Storage Box for the Parlor or Living Room

Simple Cord Adjuster

The height of any object suspended from the ceiling may be quickly adjusted by using the knot-and-loop method illustrated. A loop, tied in the cord near the object, catches on one of several knots tied in the other end of the cord, which has been passed over a pulley. Since these knots may be changed to suit any need, the method is adaptable to use with electric lamps, banana bunches, clotheslines, and many other objects.—Charles Brocksmith, Bicknell, Ind.

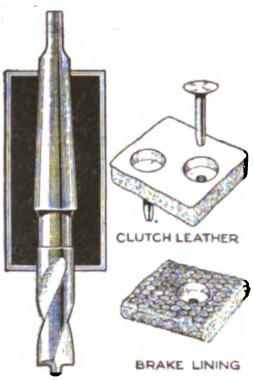


Flagpole Pulley Lubrication



The pulleys used on flagpoles are so exposed to weather conditions that they rust very quickly, and wear out the halyard rope by their roughness, as well as by the pulley remaining stationary instead of turning. This trouble may be avoided by tying soft sponges to the halyard rope, saturating them with light machine oil, and jamming them into the pulley block by hauling on the rope first from one side, then from the other, repeatedly. This insures the pulley being well oiled, and should be done about once a month.

Counterboring Drill for Clutch Leather and Brake Lining

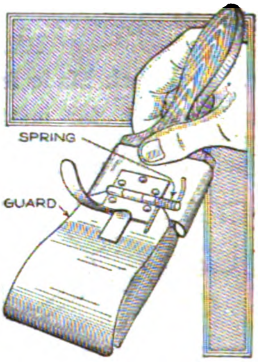


In installing new brake linings and leather facing for friction clutches on automobiles, it is necessary to counterbore the brake lining, or leather, in order to let the rivet ends in below the surface, so that they will not come in contact with the metal friction surface. This work of counterboring is difficult for an inexperienced person to accomplish, because it is important that the hole must not be so deep as to weaken the fastening of the lining. A twist drill, ground as shown at the left of the drawing, will do this work very nicely. It is used in this way: After the leather or brake lining has been put in place, and the rivet holes made in it, lay it on a flat piece of iron on the drill-press table. Place this specially ground twist drill in the drill-press chuck, and start the point of it in the rivet hole. Drill down until the point touches the iron. With a little care, all the holes will thus be countersunk to the same depth. The length of the central point on the drill will, of course, depend on the thickness of the lining or leather.

Fungus Razor Hone

Canadian woodsmen make a serviceable razor strop from the fungus growing on tree trunks. The fungus is stripped from the bark, and cut level on one side. By gluing it to small pieces of lath, a strop can be made which puts a very sharp edge on a razor. A short stroke is necessary, as most fungus growths are not more than 6 in. long.—James E. Noble, Kingston, Ont., Can.

Guard for Paintbrush



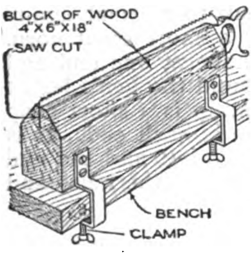
The amateur house painter is apt to overfill his brush, which means trouble when working on wainscoting or window sashes. An easily made appliance to remedy this consists of a zinc or tin sheath fitted tightly to the brush handle, and fastened by a hinge to a metal guard. The sheath can be slid up the handle far enough to leave the bristles projecting ½ in. below the guard, which must be of sufficient curvature to prevent contact with the bristles except at the lower end, where it presses against them. The hinge pin should project beyond the hinge at one side, so that a small coil spring may be used to hold down the guard, which is raised for dipping by a lug or handle made of a strip of heavy metal. Solder and small rivets are used in fastening the parts together.—James E. Moore, Portland, Ore.

Driving Auto with Sheared Hub Key

A makeshift repair job on the hub of a light automobile was made by using a pipe wrench as a spare part. Owing to a sheared hub key, one of the rear wheels became loose from the floating axle, and ran free in the hub cap. The driver removed the cap, borrowed a pipe wrench from a neighboring farmhouse, and, fitting it to the threaded shaft end, he fastened the handle with wire to one of the spokes of the wheel. On reaching home the slightly damaged threads were soon put in shape with a thread cutter.—Dale R. Van Horn, Lincoln, Neb.

Simple Wooden Block Forms Saw-Sharpening Clamp

A simple saw-sharpening clamp can be made from a block of wood, 4 by 6 by 18 in. A saw cut is made lengthwise in the narrow edge of the block. This should be deeper at one end than at the other. Two iron clamps, bent as shown in the drawing, are screwed to one side of the block, one clamp being placed at each end. To sharpen the saw, clamp the block to the top of the workbench and insert the saw, teeth up, in the slot cut in the block; then file as usual.—P. P. Avery, Garfield, N. J.



Straw Hat Protects Garden Plants

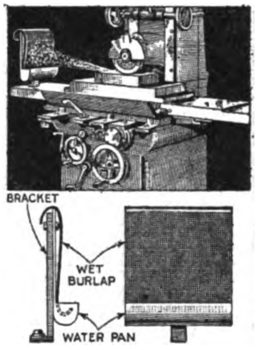
A discarded straw hat will serve in early spring to protect plants from frosts. Especially for city gardens, better results are said to be obtained with such a protector than with one made of metal. The hat is put over the plant, and a stone or other weight is set upon it to keep the wind from blowing it away.

Countersink Gauge on Key Ring

An inexpensive countersink gauge for flat-head wood screws employs sample screws, with the threaded portions cut off, and the remaining ends rounded so as to reduce wear on the pocket. Flat tips are soldered into the slots, with holes drilled to fit a key ring. The gauge is used to determine the proper depth to countersink for screw heads of the same size as those in the gauge.—E. Alpha Dean, Chicago, Ill.

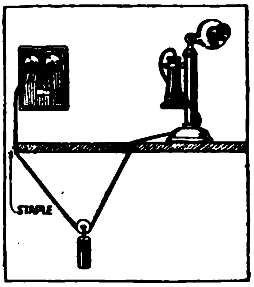
Dust Catcher for Grinder

A very effective dust catcher for surface grinders consists of an iron bracket, to which is bolted a broad piece of sheet metal, with a water pan or trough built on at the bottom. A piece of heavy cloth, or burlap, is hung over the sheet-metal surface, long enough to reach down into the water trough. The burlap soaks up the water like a wick, and is always kept wet. Emery dust and small metal particles thrown against it are caught and kept from flying around the shop.



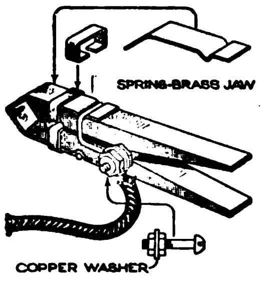
A Simple Telephone-Cord Adjuster

To prevent knots in a telephone cord, pass it through a staple and a hole drilled in the counter or desk on which the instrument stands, and hang a weight by a pulley from the cord, keeping it always taut.



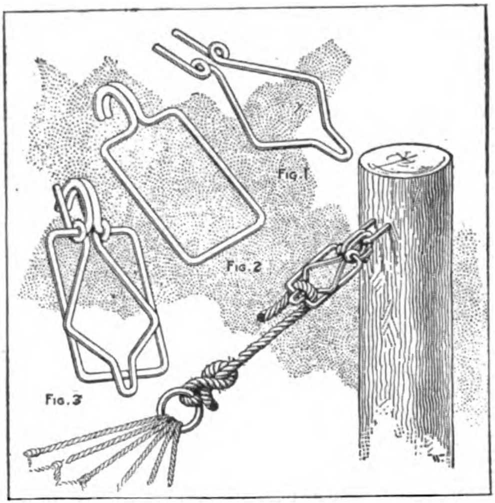
Spring Clothespin Easily Converted into Efficient Testing Clip

The advantages of using a testing clip which has large capacity and a positive grip are well known. Such a clip can be made from a spring clothespin by fitting spring-brass or bronze jaws under the spring on the clip, and slipping a binding post bolt through the spring coil for connections. The jaws are held firmly to the clothespin by straps, or bands, of the same metal, which fit into the grooves in the two halves of the clothespin.—Milton H. Shoenburg, San Francisco, Calif.



A Quick-Acting Rope Clamp

A rope clamp which will hold firmly can be made of wire in a very few minutes. The size will depend somewhat upon the size of rope it is to be used with. It consists of two parts, both made from No. 3 gauge (¼-in. diameter) steel wire, bent to shape. A diamond-shaped section, Fig. 1, with a tongue at one end and a loop at the other, and a rectangular part, Fig. 2, which has a loop at one end formed of the wire ends, make up the assembled clamp, shown in Fig. 3. The ends of the diamond-shaped piece are twisted around the shoulders of the rectangular piece. These ends should extend out horizontally at the sides of the hook formed by the ends of the rectangular piece. The illustration shows the clamp in use on a hammock rope. The diamond-shaped piece is raised, the hook placed over the staple, the end of the rope looped around the tongue of the clamp, and finally the diamond-shaped piece is lowered.—C. A. Black, Jr., Hightstown, N. J.



The Rope Clamp, for Hammocks or Similar Use, Holds Tighter as the Weight on the Rope is Increased

Rubber Sponge Cleans Wall Paper

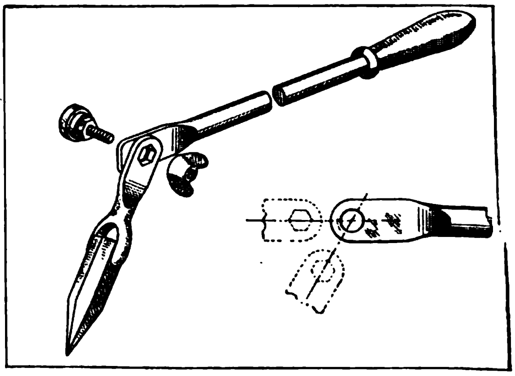
A rubber sponge, which may be purchased at five and ten-cent stores, will clean wall paper very nicely. It leaves no streaks or sticky rolls on the paper, requires no kneading, and is always ready for use; the dry sponge crumbs can be taken up quickly with the vacuum cleaner or brushed up with a broom, and they wi not stick to the floor or tramp into t rugs. The rubber sponge can also be used to clean flat-painted walls and varnished woodwork, and to remove the smoke, dust, and "cloud" from polished dark-wood mantels or furniture. It is also good for cleaning picture frames, chandeliers, and other gilt or lacquered articles.—Wm. T. Grinstead, Columbia, Mo.

Tethering Breaks Hens of Sitting

One of the quickest and best ways of breaking hens of sitting is to tether them out of doors, where there is no chance to sit, and where the fresh air and freedom soon bring them back to normal again. The tether is simply a short stout cord, fastened to a short stake at one end and to a leather strap around the hen's leg at the other end. This strap is a short strip of leather with a hole in each end. It is placed around the hen's leg, and the end of the cord slipped through the holes and tied.

Soldering Copper Has Jointed Handle

One of the handiest tools in a certain machinist's kit is a soldering copper with a jointed handle. It was made from a regular shop soldering copper, by cutting the handle near the copper and flattening it for a short distance, then drilling and filing a hexagon hole. The same was done on the end of the handle rod, except that the hole was left round. Next, a special steel bolt was made, with part of the body filed to fit the hexagon hole. The two parts of the handle were then put together, and the bolt inserted so that the round part of the bolt fitted into the round hole, and the hexagon body into the hexagon hole, the wing nut being placed on this end and tightened.



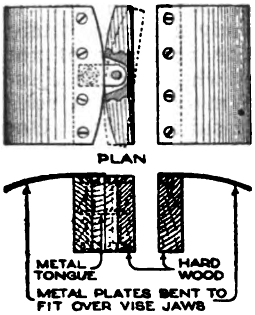
A Soldering Iron with a Jointed Handle may be Set at Various Angles

This permitted the handle to bend to any angle without turning the nut, which keeps the joint tight at all times.

Cup Grease Keeps Gaskets Soft

Shellac is often used on gaskets to make them adhere to the metal surface while assembling. Gaskets thus treated are rendered hard and brittle, and must be replaced when the parts are reassembled. Cup grease, smeared on the gasket, will serve the same purpose, and will keep the gasket soft and pliable.

Swivel Jaws for Holding Wood in Iron Vise



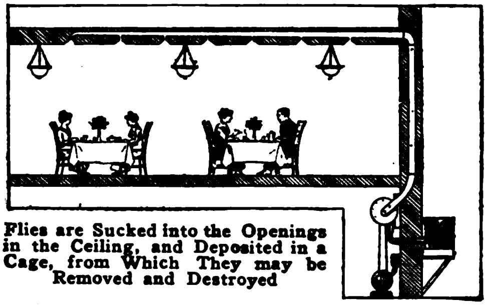
Auxiliary jaws for holding either flat or angular pieces of wood in an iron vise can be made from scrap materials. Cut three pieces of hard wood to the width and height of the jaw faces. Round off two of these on one side, and cut a mortise in the round face of each block, long and wide enough for a short swivel hinge made of a piece of strap iron with a hole drilled in each end. Insert the ends of the hinge into the mortises, and drive heavy steel pins, such as sections from large nails, through the two holes made in it. Cut two heavy pieces of brass, or other sheet metal, as wide as the vise jaws, and long enough to reach from the face edge of the jaw, back over the curve. Screw these pieces to the auxiliary jaws, one to the flat, plain piece, and the other to one of the hinged blocks. These metal strips are to hold the wood jaws in the vise when it is open. The swivel jaws thus made enable the vise to grip either flat or angular pieces of wood.—A. B. Nutting, Boston, Mass.

Knots in Pattern Lumber

When it is impossible to obtain lumber for pattern work which is free from knots, it is often possible to bore out a knot, plug the hole with a piece of the same material, and dress it off to a good finish. The plug can be glued in place and will not be found to cause trouble in most pattern work.

Vacuum Fly Catcher

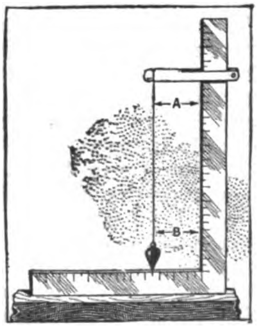
A large restaurant made use of an interesting fly catcher. A 7½-hp. motor in the basement was used to drive an inclosed blower fan, with the outlet extending through the wall to the outside. A 10-in. pipe was connected to the suction end, and was carried up through the wall to the ceiling of the restaurant room. Here it branched into numerous funnel-shaped openings in the ceiling.


Flies are Sucked into the Openings in the Ceiling, and Deposited in a Cage, from Which They may be Removed and Destroyed

A cage of wire screen surrounded the outlet opening and a drawer was placed underneath the cage. When the motor was running, the flies were drawn into the funnel-shaped openings through the 10-in. pipe, and deposited in the screen cage out of doors. They were removed when the drawer became full. Before the cage was built over the outlet, the owner observed that the flies blown out by the catcher returned instantly by way of the front door.—H. S. Rich, Cromwell, Conn.

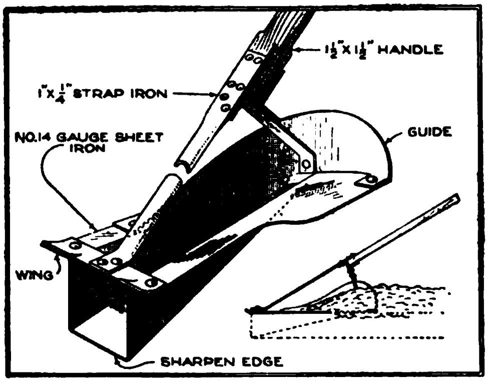
Square Used as Level

Any carpenter's square, together with a plumb bob, can be used to form a level. Hold the plumb bob, or fasten it with a clamp, to one leg of the square held upright. When the plumb bob hangs so that the distance A is equal to distance B, then the surface is level in the direction tested. A clamp for the purpose can readily be made from a stick of wood by sawing out a slot and driving a nail or screw through the slotted end.—Paul Gorton, Big Rapids, Mich.



Plow for Garden Furrows

Using a hoe or small garden plow for making furrows, in which to plant potatoes or set out plants such as cabbage or tomato, is a tedious task, and does not always produce the proper kind of furrow for the particular thing being planted.



Furrows for Potato Planting can be Made by Using a Plow Made from Sheet Iron

The furrow plow shown in the drawing was designed to dig rapidly in soil that had been plowed and harrowed. With it a furrow of the proper width and depth can be cut nearly as rapidly as a man can walk and guide the plow, and with little more exertion. The size of the plow can be made to cut the size of furrow required.

For the body of the plow, use No. 14 gauge sheet iron. The cutting edge is of the shape and size of the finished furrow, and the metal tapers from this edge to the rear end of the implement. Wings, 3 in. wide, bent over at the top of the sides, regulate the depth to which the plow cuts. Strength is obtained by putting a strip of 1 by ⅜-in. iron across the front edges of the wings, which should be turned up to keep them from digging into the ground. A curved sheet-iron guide is riveted to one of the top edges, to throw the dirt to one side of the furrow. The handle is made from hickory, or oak, 1½ in. square and 4 or 5 ft. long. It is fastened to the plow with a piece of strap iron, 1 by ¼ in., in front, and another extending back to the curved wing behind. The front strap may be curved as shown, to make it more rigid. When the front edges have been filed sharp, the implement is completed.

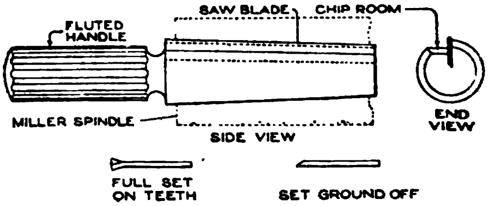
¶For many working sketches made in pencil, plain long-hand writing is much to be preferred to hurried lettering.

Removing Enamel from Magnet Wire

Many amateurs have trouble while winding coils of various kinds with enameled magnet wire, because of the difficulty in scraping off the enamel without breaking the wire. One way of removing the enamel is to pass the wire over a Bunsen gas flame several times, until the enamel melts and drops off. If it is impossible to do this, the same result may be secured by dissolving the enamel in amyl alcohol.—Peter J. M. Clute, Schenectady, New York.

Reamer for Cleaning Taper Holes

When the arbor of a milling machine, or the center of a lathe, is found to be out of true, the condition may be due to small pieces of waste, or chips of metal, on the surface of the taper hole. To remove these, it is desirable to have a tool that will work this dirt off firmly and completely, without damaging the accuracy of the tapered hole. A tool which fulfills these requirements can be made from a stick of soft, white pine of suitable size. One end of the stick is turned to fit the taper hole. In its surface, exactly parallel with its length, is inserted a piece of thin hacksaw blade, the teeth of which have been ground off flush with the sides of the blade. The slot in which the saw blade is inserted is cut by the blade itself, after the set has been thus ground off. The blade is inserted, teeth down, and should project about 1/32 in. The edge is then carefully straightened with an oilstone, and backed off very slightly. The final fit to the taper hole is made by inserting the tool and tapping it lightly with a hammer, thus forcing the saw teeth farther into the wood, until the blade projects only about .01 in. from the shank. A space should be cut at one side of the blade to accommodate the chips, or other particles of dirt, which may be scraped off. A fluted handle is provided, by which the tool is turned. It should be with-



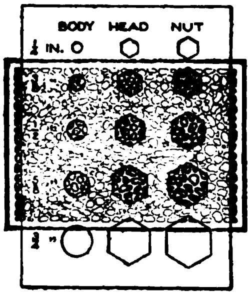
A Hand-Operated Reamer will Clean Out Dirt Which Sticks Tightly in the Spindle of a Lathe or Milling Machine drawn in such a way that the dirt will be largely removed with it, and any loose dirt should afterward be blown out of the hole.—Joe V. Romig, Allentown, Pa.

Iodine for Scratches on Furniture

Scratches on dark-oak furniture may be greatly improved in appearance by carefully painting the scars with iodine, using as many coats as necessary to produce the desired depth of color. When this is dry, go over the whole piece of furniture with a good furniture polish.—John P. Robinson, Santa Fe, N. Mex.

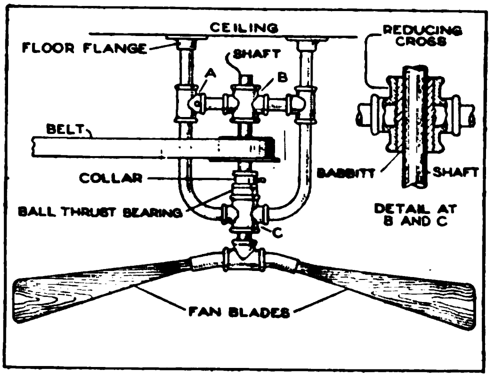
Draftsman's Bolt and Nut Ruler

Draftsmen who frequently have jobs involving a large number of bolts and nuts of standard sizes, will find a transparent ruler, like the one illustrated, to be a great timesaver. The sizes of bolts most frequently used are selected, and a circle of the same diameter as the bolt is laid out, with hexagon figures in line with it, representing the standard sizes of the head and nut, respectively, for a bolt of the diameter indicated. When this has been done for as many different sizes as desired, cut out the holes with drill, and file to the shape marked. By placing the point of the pencil inside of these holes, with the ruler laid on the drawing at the proper place, bolts and nuts of these sizes can be drawn very quickly.



Ceiling Fan for the Shop Made of Pipe Fittings

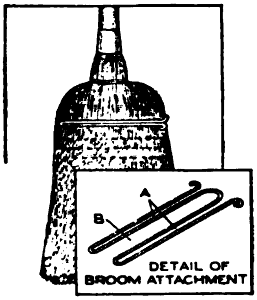
A great convenience in the small shop in hot weather is a rough but powerful fan which can be driven by a belt from a small pulley, set anywhere on a countershaft or main shaft. The fan here shown is cheap and durable. It is made of common pipe and fittings, except for the fan blades, pulley, and bearings. The vertical shaft is a piece of pipe which should be finished in a lathe if possible, or at least smoothed off for a few inches at two points. It works in bushings made by pouring babbitt into the reducing cross fittings, these being plugged with clay or wood so that the babbitt does not run out through the small ends of the cross. A worn ball thrust bearing from an automobile, and a collar with a setscrew, support the weight of the fan. The fan blades are cut from wood, screwed into short pieces of pipe, and fastened with pins if necessary. In assembling the frame, it is necessary to file away the threads at A and fasten with a pin; other connections can be made in the usual way. The belt should pass around one side of the frame, in order that its pull will come in the direction where the frame is strongest.—J. H. Norrell, Augusta, Ga.



The Fan is Made Almost Entirely of Pipe Fittings, and Driven from Any Shaft on the Ceiling

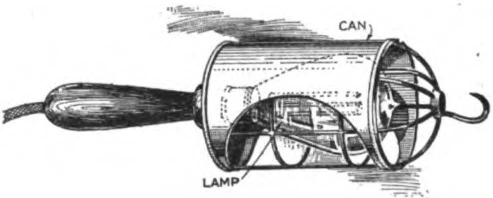
Attachment Fastens Cloth on Broom

Housewives often find it necessary to fasten a cloth on a broom for use on walls or floors. By the use of a piece of wire, bent as shown in the sketch, the cloth may be quickly attached or detached. Stiff spring-steel wire, nickelplated, is the best to use, but spring brass, if somewhat larger, will also be found satisfactory. The central opening B, between the wires, should be only wide enough to make a tight fit on the broom. The two wires on each side, between which the cloth is placed, should have a very narrow space, A, between them, except when sprung apart to insert the cloth.—Wayne W. Leyrer, Atlantic City, N. J.



Trouble-Lamp Reflector Made from Tin Can

In the ordinary trouble lamp used around machinery, the glare from the lamp interferes with clear vision and the operator is more or less "blinded." To overcome this objection, a garage man constructed a reflector from a tin can, in the manner shown in the sketch. Both ends were removed from the can, one entirely and one only partially, and a portion of the side cut away, leaving an oval opening.

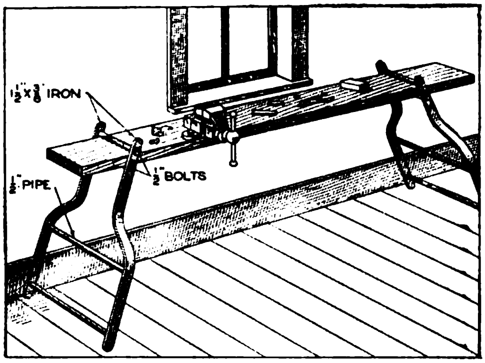


A Tin Can Forms a Cheap and Efficient Reflector for the Shop Trouble Light

The remaining tin was slipped over the wire protector on the lamp, and gave excellent results both as an eye shade and as a reflector.—L. B. Robbins, Harwich, Massachusetts.

Portable Bench for Plumbers

A plumber's bench, which is easily carried from place to place, can be made from four pieces of iron bar, eight long bolts with nuts, and eight short lengths of pipe. The iron legs are bent as shown in the sketch, and four ⅝-in. holes are drilled in each, for the rungs. The legs are put together with the long bolts and nuts, using the pieces of pipe as spacers. When completed, the sides of each truss should be 12½ in. apart at the top, and 18 in. at the bottom. The two top rungs are 4 in. apart. It is an easy matter to carry these trusses to the job and to insert a length of 1½ or 2-in. plank, which can nearly always be found on the premises. The bench thus made is strong, light, and durable.



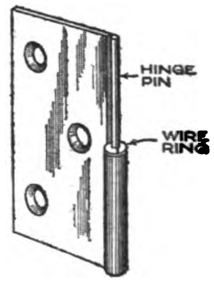
A Portable Plumber's Bench is Formed by Inserting a Plank between the Rungs of the Two Trusses

Bearing Races Tightened by Solder

When the race of an automobile ball or roller bearing works loose, the surrounding metal may become so badly worn that even a new race fits loosely. In such a case the worn surface can be built up with solder until it makes a tight fit, and the bearing can then be forced into position with a hardwood punch. Loose dust caps can be fixed in the same manner.—Fred Page, Winfield, Kan.

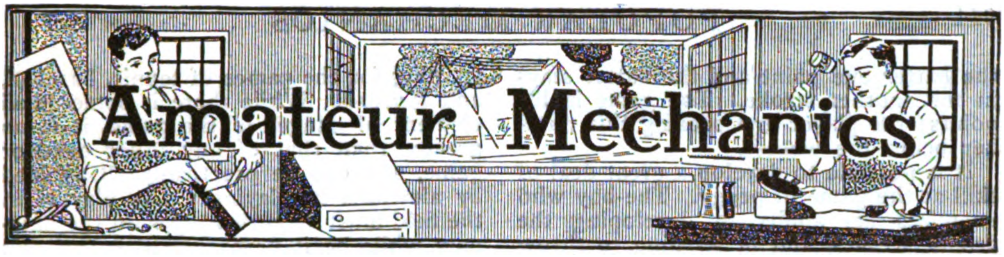
Remedying a Sagging Door

Sometimes a door will bind against the sill, due to wear in the hinges and to sagging. A good way to remedy this trouble, without trimming the door or sill, is as follows: Remove the door and slip a small ring made from soft-iron wire over each hinge pin, as shown in the sketch; when the door is replaced it should clear the sill. If one ring on each hinge does not take up the wear, then another can be added to each pin. A quick way to make the rings is to wind the wire on a rod a little larger in diameter than the hinge pins, and then cut through the coil lengthwise with a hacksaw. Each turn of the coil when removed from the rod will be a split ring. The saw slot can be squeezed shut with a pair of pliers.—J. A. Weaver, Baltimore, Md.



Wire Prevents Rubber Tube from Breaking When Bent

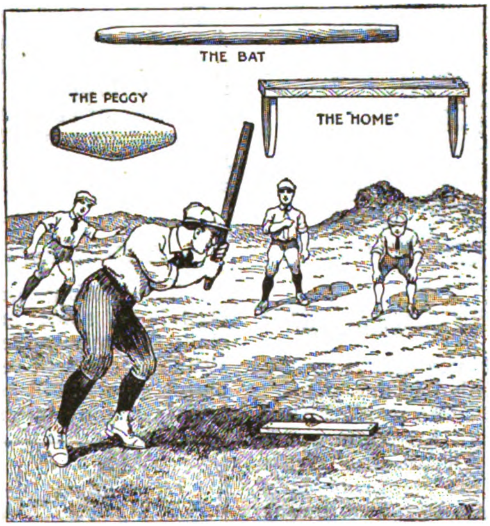
Rubber tubing used for joining pieces of glass tubing is liable to crack at the bends, or to flatten and cause an obstruction. To keep a joint from closing, make two loops a few inches apart in a piece of wire, taking care that the loops have the same diameter as the inside of the tube, and insert the wire at the place where the trouble occurs.—Stanley Trier, Maywood, Ill.



"Peggy"—an Exciting Outdoor Game

By J. T. BARTLETT

AMONG the old American games for boys which are not as well known as they should be is "peggy." It has the advantage that it can be played by any number of boys. It requires nothing that must be purchased; the few objects required are readily made out of wood. As a preparation for the better known games of tennis and baseball, peggy is admirable training. The pasture, the field, the little-used road, the vacant lot, all are satisfactory playing grounds. The surface need not be level, though it should be smooth enough to permit running over all parts of it. The objects necessary for playing the game are a bat, a wooden projectile called the peggy, and the "home."



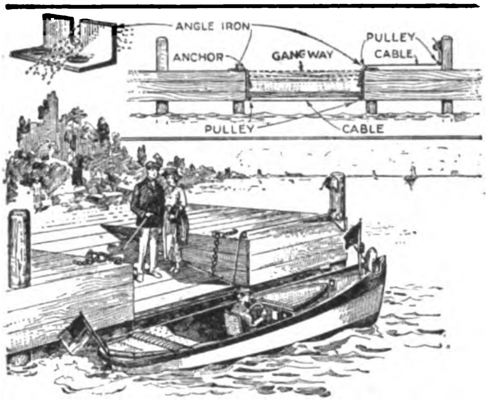
The Game of Peggy, Played with Objects Which can be Cut Out in an Hour's Time, Is Capable of Providing Real Excitement

To make the home, two stakes, 1 ft. long, each cut off square at the top, are driven into the ground until they project from it scarcely at all. They are placed 18 in. apart. Next, a crossbar is nailed to them, 18 in. long, 1½ in. wide, and 1 in. thick. The bat should be from 2 ft. to 2½ ft. long. It should preferably be made of a round piece of ash, 1¼ in. in diameter, but any other wood, not heavier than ash, will give satisfactory results. To make the peggy, a piece of wood, either hard or soft, should be cut out about 4 in. long and 1½ in. square. The four edges should be rounded off, and the piece should be tapered from the middle, almost but not quite to a point at each end. The edges at the ends should then be rounded off also; smoothing down with sandpaper makes a better job, although this is not essential. These objects can be made by almost any boy in an hour's time. Only one peggy and one bat are required for each game.

The game is played in this way: One boy is "in," while the rest are "out." The counting out, as in many other games, determines which player shall first be in, or wield the bat. The player selected lays the peggy against the home in the manner illustrated, with one of the ends protruding above it. He strikes this upper end a carefully adjusted blow with the end of the bat, and the peggy bounds into the air, whirling about continuously. Before it falls to the ground, he strikes it a powerful blow with the bat, just as is done in baseball. Depending on his ability or strength, the peggy will travel 10 yd. or 30, or perhaps 60. The other players each try to reach the peggy wherever it falls in the field, and the first reaching it throws it at the home. To mark more clearly the position of the home, the batter should place the bat upright in a hole directly back of the plate as soon as he has struck the peggy. He then retires while the peggy is thrown at the bat. If the player who has thrown the peggy hits the bat with it, he goes in, and his achievement in hitting the bat scores him five points. If he misses, but the peggy stops within a bat's length of home, he still goes in, but without the five points. If he misses by more than one bat's length, each length to the peggy counts the batter one point and the batter stays in for another stroke. The game is 100 points; the player first scoring this number being the winner.

It is possible to develop a great deal of skill at the game of peggy. The boy who exercises his ability in developing the proper strokes, and in learning to throw the odd-shaped projectile accurately, will not only be able to score high, but will be giving his eye and his arm excellent training for the games of tennis, baseball, and football. While there is some small element of danger in the game, it is no greater than that of any other outdoor game, and can be practically all avoided by alertness in playing. The players in the field must keep their eyes on the batsman while he is preparing to strike, and the batsman must not stand near the plate after he has delivered his stroke and set up his bat as the target.

Dock with Runway Adjustable to Various Levels



The Adjustable Gangway can be Raised or Lowered to Suit Any Size of Boat or Any Water Level

One of the faults of the ordinary dock or pier, used by pleasure boats or commercial craft, is that the gangway by which the boat is boarded is not adjustable to different levels. The result is that the gangway is too high for some boats and not high enough for others. If affected by tidewater, the gangway may not be right for the same boat at different times.

The illustration shows a dock and gangway designed to fit all boats, within certain limits, at any stage of tide; the gangway can be raised or lowered to suit the conditions.

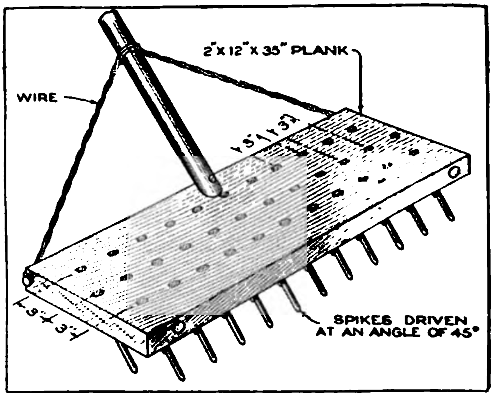
This gangway is a part of the flooring of the pier, cut to whatever width is most convenient, and hinged at one end to the main part of the flooring. At the free end, two pulleys are bolted to the under timber of the gangway, and a wire cable, fastened at one end to the dock, is threaded through the pulleys, over another pulley on the other side of the gangway, and secured to the drum of the windlass on one of the pier timbers.

After the gangway has been raised or lowered to the desired height by the windlass, it is held at that level by chains bolted to each side of the gangway, which fit into angle-iron catches on the permanent flooring of the dock, at either side of the gangway. Each catch is a short piece of angle iron, into which a notch has been sawed. It is only necessary to slip a link of the chain into this notch to hold the gangway at the proper level.

The size of the windlass required will depend entirely upon the size of the gangway and the height to which it is to be raised or lowered. If possible, all fittings should be of galvanized steel, to resist the tendency to rust. Such a dock will add much to the efficiency and convenience of a landing place.

A Homemade Garden Harrow

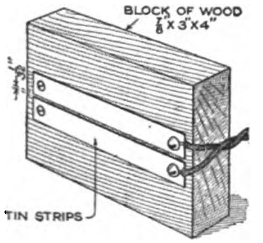
After spading some bits of ground for seed beds, some means of reducing the clods to finely pulverized soil is necessary. While a rake will serve the purpose, much better results will be obtained in a shorter length of time by using a homemade garden harrow. A piece of 2 by 12-in. undressed plank, 3 ft. long, serves as the



Spaded Ground may be Leveled, and the Soil Pulverized, by Using a Harrow Made from Spikes and a Piece of Plank tooth holder, and gives the necessary weight. A broomstick is set into one edge of the plank at an angle of 45°, and is braced by wires twisted between it and the corners of the plank. The teeth are 60-penny spikes, driven through the plank in holes previously bored for them at an angle of 45°. The spikes should be 3 in. apart in the row, and the rows 3 in. apart, and "staggered," that is, with the spikes of one row set to come opposite the spaces between the spikes of the row next to it. Other large nails may be used to keep the plank from splitting, by first boring holes for them in the edge of the plank.—W. W. Irvine, San Fernando, California.

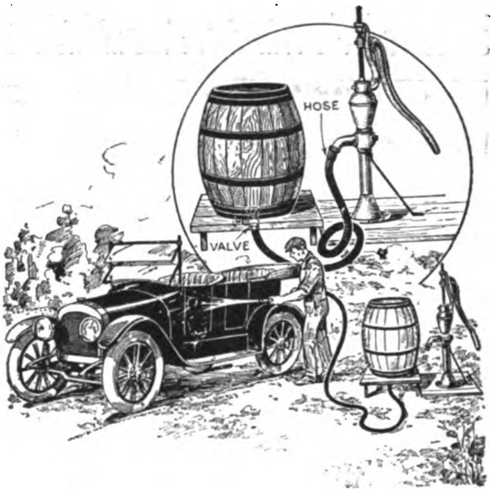
Flies Killed in Electrical Trap

The sketch shows an electrically operated flytrap, which kills the flies instantly. Two strips of tin, ½ in. wide and 3¼ in. long, are mounted with a space of 1/32 in. between them on an oak block, 3 in. wide, 4 in. long, and ⅞ in. thick. Electrical connection is made from the house-lighting circuit to the screws which hold the tin strips to the block. For bait, a little sirup is spread on the tin strips. The block should be set up edgewise, and is best protected by a wire cage of some kind which will allow the flies to reach the tin strips, but will keep persons from touching it, or metallic objects from making a short circuit. The flies, attracted by the sirup, move from one strip to the other, thus making connection through their bodies, and are so electrocuted.—Frank E. Menehan, Monroe, Wis.



One-Man Pressure Sprayer Uses Ordinary Force Pump

The great difficulty in washing automobiles, where no water under pressure is available, is to operate the sprayer pump, and at the same time use a sponge effectively. A large water and air-tight barrel with both heads intact will be required. A faucet or valve, to which a hose can be attached, is inserted in one of these heads. The barrel is then placed, with the faucet down, upon some sort of platform. A hose is attached to this faucet, and to the nozzle of the force pump. After the valve is opened, water should be pumped into the barrel, until it is about three-fourths full. The valve is then closed, and the hose removed from the nozzle of the force pump. To use the barrel as a force spray, it is only necessary to put a nozzle on the hose and open the valve at the bottom of the barrel. The air, which is compressed by pumping the water into the barrel, forces the water out when the valve is opened, thus making an effective spray. All these operations can be performed by a man working alone.



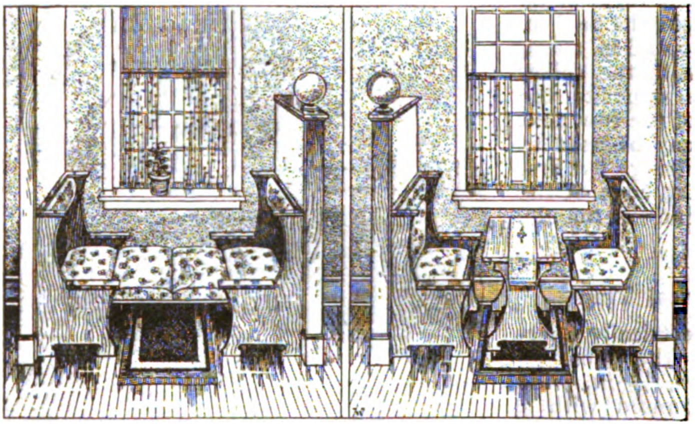
Water from a Well or Cistern is Used with All the Convenience of a City Pressure System

Goblet Made into Dinner Bell

The dinner bell in the photograph was made from scraps picked up around a jewelry shop. The bell proper is the upper part of a broken goblet. The remaining portion of the standard was ground off smooth, and a hole was drilled through it. Through the hole extends a small brass bolt, to which is fastened an ivory handle taken from a broken nail file. The clapper and chain are part of a watch chain. While the tone of the bell is not loud, it is easily audible, and the appearance is very attractive.—M. M. Bakula, Havre, Mont.

Breakfast Room and Sleeping Compartment in the Kitchen

A good night's rest, and a comfortable breakfast in bed, may be enjoyed without leaving the confines of the kitchen, if the proper furniture is installed. The important feature of the plan is the use of two benches which are convertible into a bed, and a table which may be easily moved from between them to some out-of-the-way corner.



A Convertible Breakfast Room and Sleeping Compartment Makes an Attractive Addition to the Kitchen, and Economizes Floor Space in a House

The cushions on the high-backed seats, or benches, are simply wooden boards, covered with cloth, and stuffed. The cloth covering is tacked to the back of the boards near the edge, and the filling stuffed in with a stick. Spring cushions may be used, if preferred. The seats are fastened to the floor with small iron brackets.

Between the benches, in the daytime, is the table, which is made of polished boards. It moves easily, on noiseless casters. A table, 3 ft. wide, 3 ft. 6 in. long, and 26 in. high, is just right to use between the benches, which are 38 in. apart, having seats 18 in. wide, 4 ft. long, and 18 in. from the floor. The removable back cushions are 18 in. wide and 4 ft. long; the permanent ones, 6 in. wide and 4 ft. long.

For privacy at night, the bed, formed of the two benches, with the back cushions supported in the opening between them, may be curtained off from the rest of the room, or may be hidden by a permanent half partition.

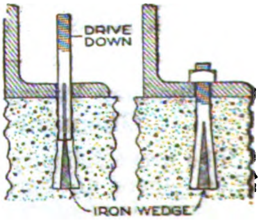
The expense of the whole depends upon how elaborate it is made. The materials may be either cheap or expensive, and the conveniences few or many. A very cozy reading place may be made of the compartment, by installing the proper reading light. This may be accomplished by wiring a flush receptacle into the wall between the two benches. Since this socket can be used for any electrical appliance, there is no reason why a toaster, grill, and coffee percolator should not be used to make the breakfast getting as easy as possible. Of course, it also allows the use of heating pads, foot warmers, and curling irons.—H. A. Shearer, Chicago, Illinois.

Wood Block Keeps Door from Rattling

Wind currents from open windows often cause doors to rattle at night, and when latches are adjusted to cure the trouble, they generally become too tight or too loose at some other season of the year, when the wood swells or dries out. A simple remedy is obtained by fastening a small piece of wood at the bottom of the door frame, so that the corner of the door will bear against it just before the latch engages. The door may then be latched by a very slight pressure, and the block holds it from rattling.—F. G. Treat, East Orange, N. J.

Expansion Bolt Easily Made from Ordinary Bolt

An ordinary bolt is readily made into an expansion bolt by the method illustrated. Cut off the head of a bolt of the proper length, and slot it with a hacksaw for a distance of 2 or 3 in. from the end. Drive an iron wedge part way into this slot; then drop the bolt into the hole in the brick or concrete. The hole should be somewhat larger at the bottom than at the top, so that the bolt will take a better hold. Drive the bolt down with the hammer as far as it will go; if the wedge and hole are properly shaped, an expansion bolt of great strength will be formed.—H. S. Rich, Cromwell, Conn.

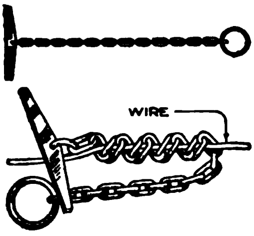


Keeping Pictures Straight on Wall

Nothing looks worse in a room than to see several pictures tilted slightly to one side. It is surprising how easily pictures shift when hung in the ordinary manner. If, instead, the picture is first hung facing the wall, then turned around without being taken down, it will not shift from its proper position. Turning the pictures gives the cord a twist which creates sufficient friction to keep the cord from sliding. This method can be used, regardless of whether the picture is hung from a molding or from a hook screwed into the wall.—S. B. Royal, Baltimore, Md.

Chain Used as Wire Grip

A short piece of chain, with a ring at one end and a crossbar at the other, makes a very satisfactory wire grip. It is wrapped around the wire, as shown, and the end of the bar, resting against the chain, keeps it from unwinding when the pull is applied to the ring. If the chain slips a little at first, twist it more tightly around the wire, and it will soon take hold.—A. S. Thomas, Amherstburg, Ont., Can.

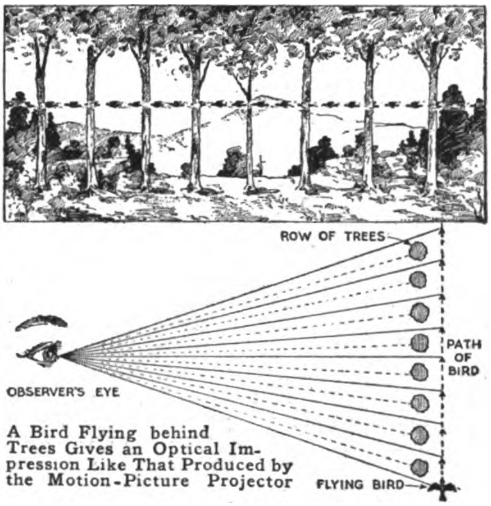


The Flying-Bird Illusion

A bird flying so that trees are between it and the observer often gives to the human eye an illusion of continuous flight. Hunters declare that although a grouse flies among several trees when the bird presents a shot, still they can see the bird easily every foot of the way through the tree trunks.

Much like the illusion of motion that the motion-picture film presents to the eye, is this illusion of continuous flight presented by the flying bird among trees. In the case of motion pictures, 16 successive pictures each second are thrown upon the screen. Between each picture is an equal interval where no picture is shown; that is, during each second there are 16 periods where a picture is shown and 16 intervals where no picture is shown, while the shutter is closed and a new picture pulled into place.

Now suppose that during practically one-half second of time the bird in the diagram flies through behind eight trees, the trees being spaced a foot apart. Obviously there are eight times when the bird can be seen by the human eye, while there are eight intervals where trees hide the bird. Still the eye "sees" a continuous flight of the bird, because each successive image melts into the next, just as in motion pictures. Even if the trees are not equally spaced and are more numerous, still the illusion of continuous flight will be present.

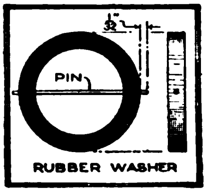


A Bird Flying behind Trees Gives an Optical Impression Like That Produced by the Motion-Picture Projector

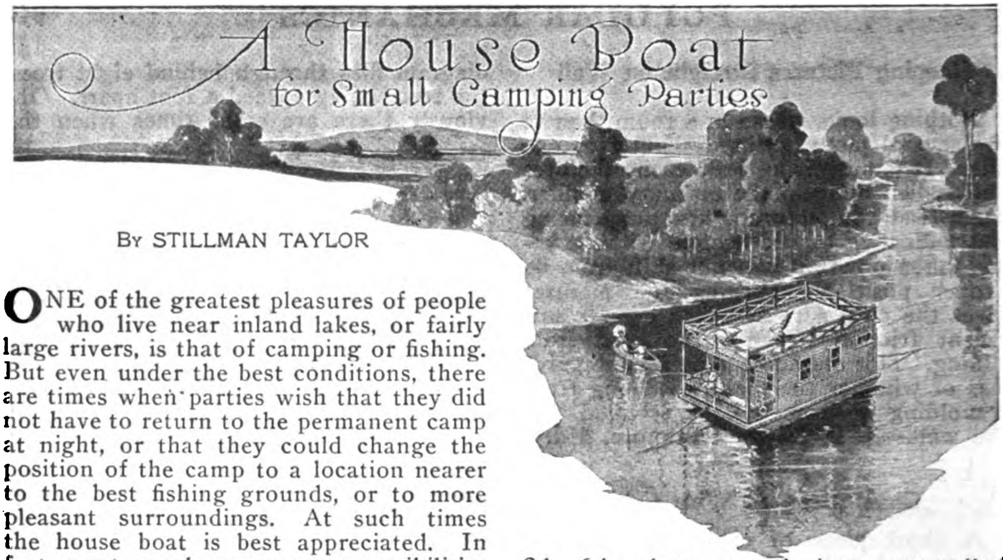
Many times hunters are deceived into believing that they should be able to kill a flying bird among trees, when actual facts prove that so many trees are in the way that the bird escapes easily. A bird might just be passing behind a tree as the shot reached its path; the human eye would see the bird all the time. But one can't fool a gun—it cannot "see" a bird when it is behind a tree, so a miss is the result.—F. E. Brimmer, Syracuse, N. Y.

To Keep Washers in Hose

When a hose is left uncoupled the rubber washer is likely to be lost. To avoid this, put a pin through the washer in the manner shown, allowing 1/32 in. to project at each end and cutting off the remainder. The washer will then stay in the coupling until worn out, for the projecting pin engages the coupling threads and prevents it from getting loose.—Francis W. Nunenmacher, Berkeley, Calif.



A House Boat for Small Camping Parties



By STILLMAN TAYLOR

ONE of the greatest pleasures of people who live near inland lakes, or fairly large rivers, is that of camping or fishing. But even under the best conditions, there are times when parties wish that they did not have to return to the permanent camp at night, or that they could change the position of the camp to a location nearer to the best fishing grounds, or to more pleasant surroundings. At such times the house boat is best appreciated. In fact, most people see greater possibilities in a week of house-boating than they do in one of the ordinary camp life.

To be practical, a house boat must be as comfortable as possible, and still be easily moved, by either a small power boat, or, in cases of necessity, by a rowboat. The boat here described is designed for a small party of three or four, and is made as light as is consistent with safety and comfort. In comparison with its conveniences, and the possibilities it opens up in the way of summer enjoyment, the cost is very low. Of course the cost depends largely upon what the owner cares to spend on it, for it may be equipped simply or expensively.

Since lightness is a first requirement, spruce or cedar should be used throughout, although other woods will serve the purpose where weight makes no particular difference.

The hull is 20 ft. long and 12 ft. wide, built of boards 1¼ in. thick and 6 in. wide.

The edges of the planks used in the sides and bottom are beveled, so that a narrow V-shaped groove is left on the outside of the seam when the planks are placed together. This groove is to hold the calking. It should not be more than ⅛ in. across at the widest part. Some people prefer to cover the hull with galvanized iron, or even painted canvas, but the calking is perfectly satisfactory, although it takes longer to do.

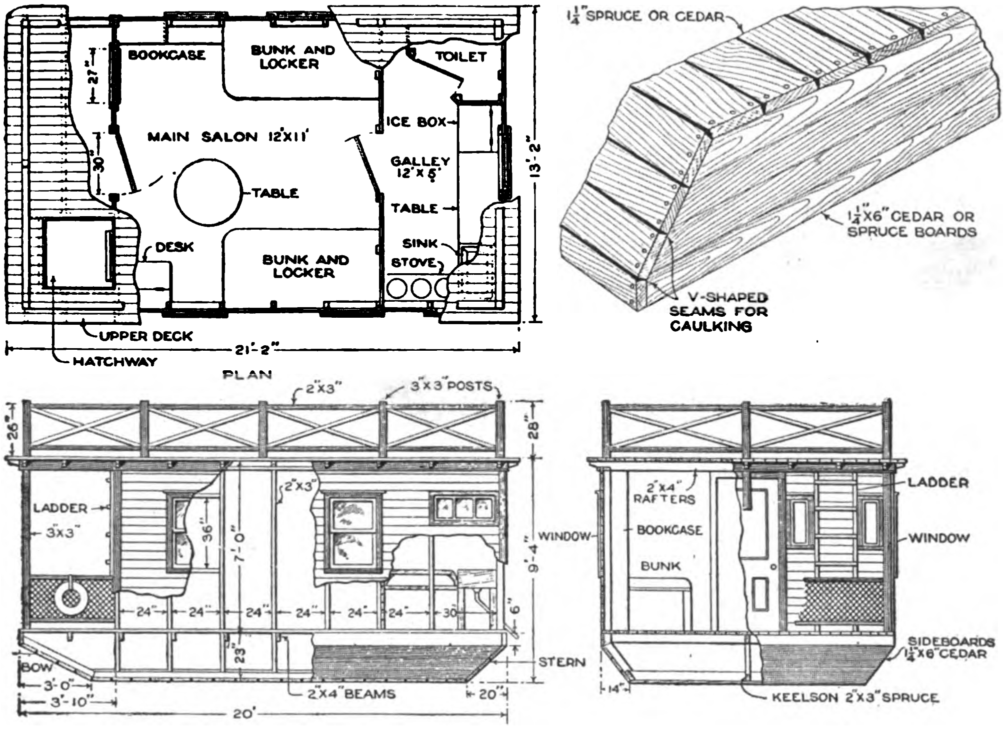
After the sideboards are cut to dimensions, they are nailed to the 2 by 3-in. ribs to form the completed side of the hull, as shown in the side and bow views. The two sides are then set up in proper relative position to each other, and the 2 by 6-in. plates, or end pieces, are nailed across the ends of the longer planks. The plates must be beveled at the edge that fits against the first bottom plank, to form a V-groove with it, for calking. The bottom planks can then be beveled, and nailed on, care being taken to get them as tightly together as possible. After the bottom is entirely planked, the center keelson is nailed in place. This is necessary to keep the bottom planks from springing.

All seams, or water-tight joints, should be painted with red or white lead, and calked. This is done by forcing oakum into the V-shaped grooves with a calking iron and a mallet. The seams must be packed tightly with the oakum, but if too much force is used the iron will be driven through the seams, which must then be patched with a batten on the inside. When the seams are nearly full of oakum, they are filled with putty and painted. All nails should be driven in with a set, and the holes puttied. The hull should then be given a coat of red-lead paint inside, before the house is erected upon it.

For the studding, use 2 by 3-in. stock, but for the rafters, and the floor joists, 2 by 4-in. pieces are necessary. The flooring, or decking, which is best made of tongue-and-grooved lumber, should be laid fore and aft—from bow to stern—and the studding nailed to it. The rafters should be set into notches cut in the plates.

Ordinary siding makes a very good-looking house boat, but any material will do. If the extreme of cheapness is desired, the sides may be boarded up part way only, and heavy canvas curtains used when necessary in rough weather. Shiplap and tongue-and-grooved lumber have both been used effectively.

For the roof, which is also the upper deck, tongue-and-grooved lumber should be used, the joints being painted as the boards are laid, to make a water-tight job. A covering of 12-oz. canvas, laid in wet paint, will improve the rain-shedding qualities of the roof, especially if the seams of the canvas are lapped at least 2 in., and the whole is given three or four coats of paint. This gives the boat a good appearance, and makes a very durable roof.



SIDE ELEVATION

BOW VIEW

The Building of a House Boat Which Is Convenient for a Party of from Two to Six Persons Requires Only a Few Hours of Careful Work, and Materials Which Are Not at All Expensive, When One Considers the Many Hours of Enjoyment It Makes Possible Each Season

Posts for the porch railing are toe-nailed to the roof decking. If an awning is desired, six of the posts should be hollow, so that longer posts, for awning supports, can be slipped into them. It is such refinements as this that add to the pleasure obtained from the boat. The added enjoyment makes the expense entirely worth while.

Access to the roof is obtained by installing a ladder on the wall of the house, leading from the front porch to the roof, through a hatchway. A railing around this opening will be a great help in climbing up or down the ladder, and may prevent serious accidents.

For the side windows, the ordinary check-rail sash are best, but the front windows should slide between the jambs. The large kitchen, or galley, window should be hinged to open outward, being held at any angle by an ordinary casement fixture consisting of a rod and thumbscrew. The small sash are hinged at the top to swing out, and are also fitted with casement fixtures.

The interior arrangement depends largely on the wishes of the owner. Bunks, about 6½ ft. long and 3 ft. wide, with storage space under them, are standard equipment for a house boat. Cots, which can be folded and stowed away in the space under the floor, bring the sleeping capacity up to as high as six persons, or even more, if use is made of the front-deck porch or the roof. The galley should be fitted with an ice box, a table, an oil stove, and a sink. Two pumps at the sink may be used to provide wash water from the river or lake, and drinking water from a tank in the hull of the boat. A toilet compartment, equipped with a marine toilet, using a pump for flushing, is a great convenience.

Tongue-and-grooved lumber, and a light door of any kind, may be used for the partition between the galley and main room, or salon.

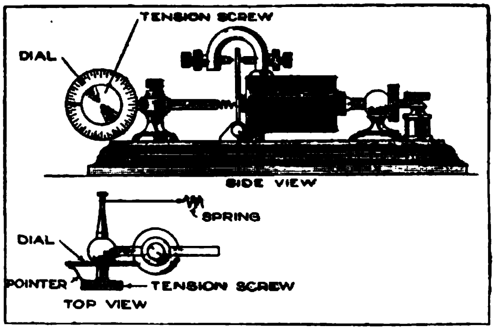
The house boat should be painted inside and out. If the interior is finished in panel effect, and stained a dark brown, there will be no need to repaint each year. A good color scheme for the outside of the boat is white, trimmed with green.

For mooring the boat, two 40-lb. stockless anchors should be used. The mooring lines should be of 1-in. manila rope, each line being at least 75 ft. long. They may be led through regular bow chocks, and the ends fastened to cleats screwed to the floor, or a ringed eyebolt may be inserted in the side of the bow plate, 12 in. from each end. This must be done before the flooring is laid.

There is hardly any limit to the amount of pleasure to be obtained from the use of this house boat. It is large enough to house an ordinary camping party, and is not at all hard to move around. Even a very small power boat will tow it against a moderately swift stream. This same boat, or a small rowboat, serves as a tender and boat to fish from. The owner will find that the hours spent in building the house boat will pay well in returns of health, pleasure, and ability to entertain his friends.

Tension Indicator for Relay

In connection with certain experiments, it is often necessary or desirable to have some method of determining, comparatively at least, the tension on the armature of a relay. This is an advantage when the relay has to be set at a different tension for each experiment. For this purpose, the knob of the tension screw can be fitted with a pointer that moves over a stationary dial, as shown in the illustration. The dial is laid out with compasses on thin Bristol board, or heavy paper, and glued to a disk, cut from thin brass, having a hole in the center to allow the tension screw to pass through. The disk is soldered to the rod supporting the tension screw, it being necessary to file away one side of the enlarged end of the supporting rod to get a good seating for the disk. The pointer, cut from brass, is soldered to the back of the tension screw. The pointer should be on the zero point when the tension on the spring is at a minimum. With this device, it is possible to reset the spring to any previously determined tension.—Thos. W. Benson, Philadelphia, Pa.



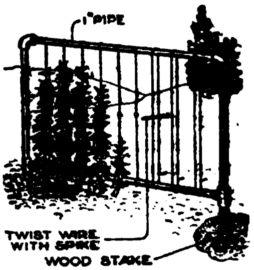
By Adding a Dial and Pointer, a Relay may be Adjusted to the Varying Tensions Throughout a Series of Experiments

Using a Camera Upside Down

Photographers are sometimes confronted by obstructions in the line of view, which would give no trouble if the camera could be operated a few feet higher up. This difficulty has generally to be faced when working in a crowd, where there is no opportunity of mounting to a higher location, and under such conditions it is handy to have a camera with its mechanism so constructed that it can be used upside down. The operator locates his subject in the finder by holding the camera over his head.

Twisted Wires Support Plants Nicely on Trellis

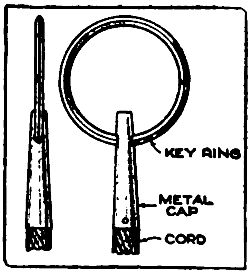
A very satisfactory sweet-pea trellis can be made by stretching wires on a frame of 2-in. hard wood or 1-in. pipe, the length of the frame being the same as the length of the rows. The wires should be placed loosely about the frame, as shown, then tightened by twisting them with a spike. A trellis of this kind can be used for several years, and if desired can be removed at the end of each season.—J. F. Campbell, Somerville, Massachusetts.



Protector for Book Covers Made from Envelopes

A cover for a pamphlet of ordinary size can be made by fastening two envelopes together. The adhesive flap of one of them is pasted to the back of the other, from which the corresponding flap has been removed. The address sides form the outside of the cover, and the pockets face each other on the inside. The flyleaves of the pamphlet are then thrust into the pockets, and the book is complete.—George L. Michel, Jersey City, New Jersey.

Use Key Ring at End of Fish Stringer



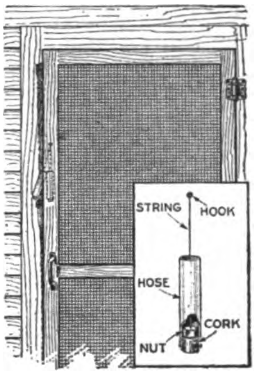
An ordinary rope fish stringer which has a metal needle on one end, and a ring on the other end for holding the fish from falling off the string, can be improved by the use of a key ring instead of the plain ring ordinarily furnished. Since the key ring can be readily detached, the fish can be dropped directly off the end of the cord, where they have been hanging, and need not be pushed to the other end of the stringer, as ordinarily done, and taken off one by one over the large needle.—Alfred Sirrine, Holland, Mich.

Tobacco Smoke Locates Roof Leaks

Leaks in a roof may admit a large quantity of water without always being easy to locate, and in such a case tobacco smoke is a reliable detective. Fill an ordinary tin can with tobacco stems, after cutting a hole near the base about the size of a dime. Take it into the room where the leaks give trouble and insert the nozzle of a small pair of bellows into the hole in the can. Light the tobacco at the bottom and work the bellows, while an assistant goes onto the roof and chalks the spots where the smoke issues. A few puffs of the bellows will bring it out in thick clouds.

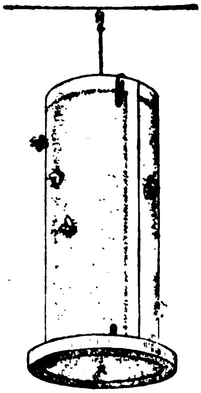
Tin flashing placed under the leaky shingles will make a satisfactory repair job, and a little ventilation will soon remove the odor of the smoke.

Cushion Hanging from String Prevents Screen Door from Slamming



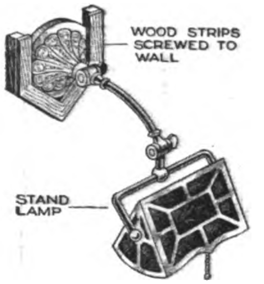
Slamming screen doors can be prevented very easily by the use of a short piece of old rubber hose. The piece of hose is fastened by a string, which extends through it, and is tied to a small cork inserted in the lower end of the hose. An old steel nut, resting on the cork, will serve as a weight to make the hose swing out. The string is attached to the door, near the knob. When the door is closed by the action of the door spring, the piece of hose will be thrown out by centrifugal force, and caught between the door and the jamb, thus cushioning the shock. As the door rebounds slightly, the hose cushion falls into its natural position directly under the screw by which it is attached, and the door then closes easily and quietly.—E. L. Howard, Springfield, Ohio.

Hang the Fly Paper Out of the Way



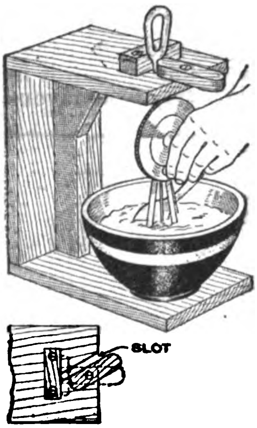
A practical way of using sticky fly paper is to hang it from the ceiling, where it is out of the way, and near one of the favorite alighting places of the flies. The paper should be rolled into a cylinder with the sticky side out, paper clips being used to hold the ends together. Since the sticky coating will slowly drip from the bottom, some means of collecting this must be provided. The cover of an old tin pail may be used. Punch a small hole in the center of the bottom. Thread a stout cord, which has a knot tied in one end, through this lid. To hang the paper in place, set the cylinder on the lid, pass the cord through the cylinder, and tie it to a small hook or screw eye on the ceiling.—A. J. Viken, Waterloo, Ia.

Device to Hold Reading Lamp on Wall


WOOD STRIPS SCREWED TO WALL
STAND LAMP

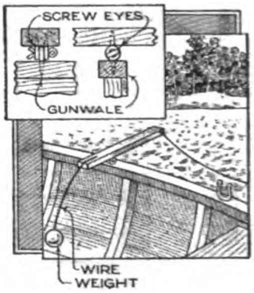
A simple device makes it possible to use an electric stand lamp also as a bracket light at the head of a bed or couch. Narrow strips of wood, joined in the shape of a half hexagon, are screwed to the wall. Wider strips of wood of the same length are screwed on top of these pieces, forming a groove in which the stand of the lamp fits and is held firmly. A lamp that is provided with a hinge where the globe is fastened to the standard, and also where the rod is fastened at the base, is the best kind to use. It can be adjusted to any angle by a person reading on the couch or bed. If the bracket is made heavy enough, an electric fan may be used in the same manner as the light.—Florence L. Clark, McGregor, Ia.

A Holder for the Egg Beater



Cooking recipes often call for the stirring or beating of the contents of the mixing bowl while another ingredient is being added slowly. Since it is otherwise impossible for one person to hold the bowl and at the same time turn the crank, a holder for the beater is desirable. The base may be made any size, but 8 by 12 in. will be large enough for ordinary mixing bowls. An upright of suitable length supports a crosspiece, 6 in. square. A slot is cut in this crosspiece at one end, just wide enough to admit the handle of the beater and hold it snugly. Two wooden blocks are screwed on the top of the crosspiece; one fastened with two screws at the inner end of the slot, and the other fastened with one screw, forming a button, at the edge of the board. In use, the mixing bowl is placed on the base, and the egg beater slipped into the slot and locked against the stationary block by turning the button against the handle. The egg beater can then be turned with one hand while the ingredient is added with the other.

Self-Acting Fish Jigger for Boat Fishing

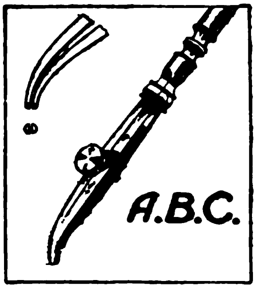


In good fishing waters, one man can catch a large number of fish in a comparatively short time by putting out several lines. The difficulty about such fishing is that he cannot keep the lines constantly agitated, so that the bait will not appear lifeless to the fish, and cannot tell when he has a bite, except by pulling up each line separately. The jigger shown in the sketch will enable him to do both easily. A piece of wood, 15 in. long and 2 in. wide, serves as the lever. Two screw eyes are inserted, ½ in. apart, about 6 in. from one end. One end of the fishline is attached to the end of the stick farthest from the eyes. A piece of spring wire, which has a weight upon the end of it, is fastened to the other end of the stick. The jigger is pivoted to the gunwale of the boat by passing a cotter pin through the screw eyes in the stick, and another placed in the gunwale of the boat. The weight should be just sufficient to balance the stick horizontally when the fishline is in the water. It should not be allowed to touch the side of the boat. Any motion of the boat tends to upset the balance of the lever, thus rocking it and moving the bait in the water. When a fish pulls at the line, the lever is given a jerk, which notifies the fisherman that this line needs attention. Several such jiggers fastened to the sides of the boat will keep a fisherman busy.—L. B. Robbins, Harwich, Mass.

Inner Tube Makes Handy Pail

A 12-in. section from a large inner tube, with one end cemented shut, and the other cut like the lip of a pitcher, makes a very handy pail for filling the radiator when out on the road, as it takes up very little space in the car.

Free-Hand Lettering Pen Made from Old Ruling Pen

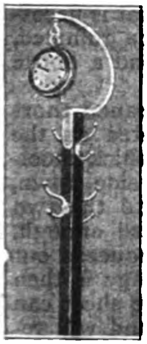


A ruling pen may be converted into a lettering pen by bending a 25° turn in it, the angle being formed as illustrated. The temper must be drawn, the bend made with round-nose pliers, and the points ground to a semicircular section. The edges can be trued on an oilstone. It is not necessary to retemper the pen. The device is very handy, and easier to fill and clean than many pens manufactured for free-hand lettering. The drawing gives an example of the work done by a pen like the one described.—Chas. P. Chalker, Ottawa, Ont., Can.

To Open a Pocketknife Easily

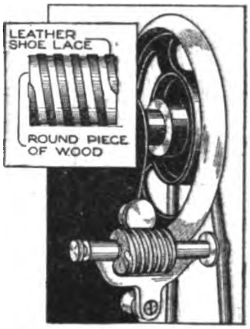
When it is found difficult to open a pocketknife without damaging the finger nail, slip a piece of good-quality paper under the blade, as shown, and pull steadily.

Alarm Clock Hung on Costumer



The feature of this costumer is that of supporting an alarm clock. The attachment consists of a piece of band iron bent into the shape of a hand sickle. What would be the handle of the sickle is screwed onto the costumer, while at the other end is fastened, with a nut. the hook that holds the clock. The costumer makes a very serviceable piece of furniture for a bedroom, and, properly adjusted, this extra weight at the top does not affect its stability. The diameter of the circle into which the band iron is bent must, of course, be large enough to accommodate the clock and hook.—C. L. Meller, Fargo, N. D.

Razor-Sharpener Attachment for Sewing Machine



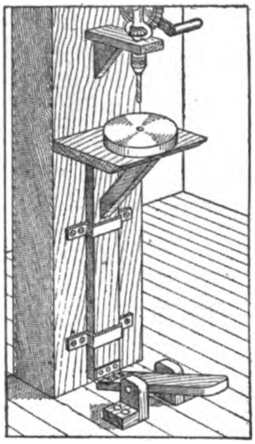
The illustration shows a novel type of razor sharpener, which is made to be used on a sewing machine. It consists of a round piece of wood, of the same length as the bobbin used in the sewing machine and having ends shaped to fit the center of the bobbin winder. This can readily be attained by mounting the block on one of the spare bobbins as a center or core. Around the outside of the wooden block is wound a length of leather shoe string, which is treated with one of the pastes or sharpening compounds made for use with razors. The razor, or blade, can be held in the fingers against the leather, or a special holder can be made, designed to take whatever type of razor is used.—E. Stumpf, Jersey City, N. J.

Small Door within Large One for Use of a Dog

In a household where the dog was the pet of the family, one of the panels of the screen door was converted into a small door for the dog's special use. The small door was mounted on double-acting hinges, so that it would open in either direction. The springs in these hinges should be strong enough so that when the whole door is open, the small door will open with it, and will not be constantly swinging back and forth by the action of the wind upon it. The device is much appreciated by the dog, and also saves time and trouble for the members of the family who formerly had to let the dog in and out.—W. W. McLean, St. Louis, Mo.

¶Stopping up cracks with plaster of Paris will keep away mice.

A Drill Press with Adjustable Table

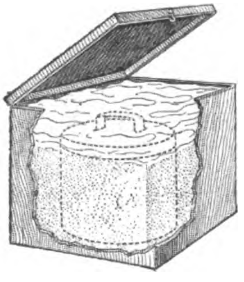


Where a hand drill, or breast drill, is mounted on a column to form a drill press, a convenient feed mechanism can be constructed, to be operated by a pedal. The iron straps should fit without much play, if accurate work is to be done, but the trunnions of the pedal should move loosely in holes somewhat wider than they are high, so as to allow for the necessary slide. The advantage of the pedal control is that both hands are left free, one to turn the crank, and one to hold the work, if necessary.—Wayne W. Leyrer, Atlantic City, N. J.

Match Scratcher on Bottom of Pipe

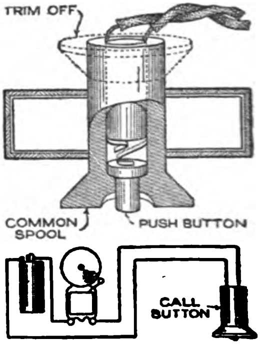
Cut several notches close together on the bottom of the bowl of a briar pipe. A match scratcher will thus be formed, which is always ready for use when the pipe is to be lighted.—J. L. Phillips, Tiffin, Ohio.

Keeping Food Hot for a Picnic



It is a great convenience when unpacking a picnic lunch to find the food hot, ready to put on the table. A large box with a tight-fitting hinged lid, fitted up as described below, will keep food warm for several hours. About 5 or 6 in. of hay, or sawdust, is packed into the bottom of the box. Upon this is set a 10-qt. water pail, and sawdust or hay is packed tightly around it to within 1 in. of the top. A good tin cover must be provided for the pail. A mattress, or pillow, stuffed with hay or sawdust, is made to fit on top of the cover of the pail, and to fill the remaining space in the box. After the food has been brought to the desired temperature, the kettle, or container, in which it was cooked, is set inside of the pail, which is then covered. The pillow is put on top of the pail, and the box lid fastened down tightly by means of a hook, or catch. Thus packed, the food may be taken to the picnic grounds, and will require no further attention until meal time.—S. Leonard Bastin, Bournemouth, Eng.

Call Button Made from Spool



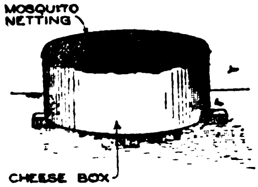
A neat and handy call button, for the sick room or the shop, can be made from an ordinary spool. The hole is enlarged from one end almost to the other, and a push button is fitted, so as to work freely in the enlarged hole. A plug is then made, which fits quite tightly. On one end of this plug are the two contact springs, of thin spring brass, and the connecting wires are laid in small grooves made along opposite sides of the plug. The wires may be fastened to the brass contacts with solder, or by means of small screws set into the plug. Before final assembling, the lower end of the spool should be countersunk, to give room for the thumb in pressing the button, and the flange at the other end should be trimmed off with a knife.—Harold E. Benson, Boulder, Colo.

How to Make Gummed Stickers

Gummed labels, or stickers, can be made very easily in the home. All that is necessary is the paper which is to be gummed, a smooth sheet of celluloid, and a bottle of mucilage.

The sheet of celluloid is cleaned thoroughly, and the paper is coated on the back, evenly, with somewhat thick mucilage. It is placed, mucilage side down, against the celluloid sheet, and the two are pressed together; not hard enough, however, for the pressure to squeeze out any of the liquid. The mucilage is then allowed to dry, after which the sheet can be stripped off the celluloid, and will retain the coat of gum. The sheet of celluloid must be larger than the sheet of paper to be gummed, and after use it should be cleaned thoroughly with warm water.

Effective Flytrap Made from Cheese Box

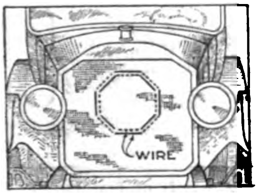


A simple and inexpensive flytrap can be made from a cheese box. Remove the bottom from the box, leaving just the hoop, and tack a piece of mosquito netting over the top. Smear the inside of the hoop, for about 3 in. up, with a thin paste made of molasses, or honey, and flour. Spread a cloth on the table and set the hoop on it, with three small blocks, 1 in. thick, under the edge, as indicated in the illustration. The flies will be attracted by the sweet paste and crawl under the bottom, up, and inside. As each fly gets its fill it will fly up against the mosquito netting. When a large number of flies are in the trap, simply give the hoop a push sideways to throw it off the blocks, then gather up the four corners of the cloth about the trap and carry to the nearest water, where the flies can be drowned.

Canceled Checks Replaced in Checkbook

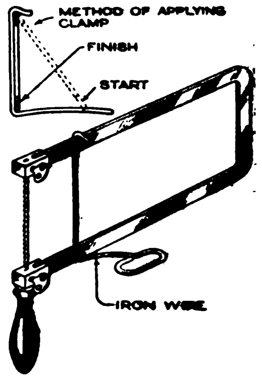
In an office, which had experienced trouble in straightening out its checking account at the bank, the expedient was adopted of pasting the returned canceled checks back onto the stub in the checkbook from which they were drawn. This method shows at a glance just what checks are still out, and has been found very convenient.—L. E. Turner, Hartford, Connecticut.

To Prevent Fan from Striking Radiator



A motorist who experienced trouble on the road from his fan striking against the radiator, made an efficient temporary repair by means of some pieces of heavy steel wire. He threaded the wire in and out through the spaces in the radiator, to form two figures, as illustrated. In this way, the blades of the fan were prevented from striking the radiator structure until a place was reached where the fan could be repaired. —Roe McKinley, Longview, Tex.

Scroll-Saw Attachment Aids the Young Workman

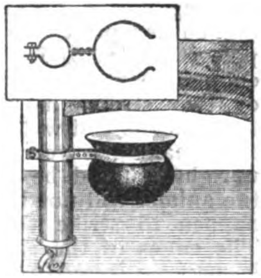


Children who like to use the scroll saw, often have difficulty in springing the frame and clamping in the saw at the same time. With this attachment, made by merely bending a piece of stiff iron wire to shape, the difficulty is removed. The saw blade is first fastened at one end only, and the wire clamp is then fitted over the frame, holding it compressed, while the other end of the blade is placed in the hole and clamped with the setscrew. The wire clamp is then removed, and the saw is ready for use.—J. G. Zimmerman, Milwaukee, Wis.

Medicine Dropper from Lamp Globe

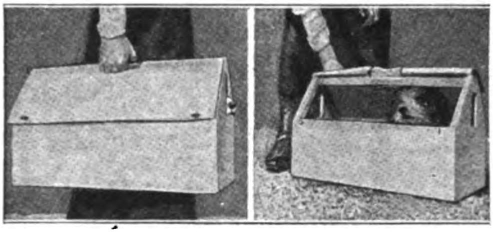
A glass rod from a tungsten lamp, with the end rounded in a flame, is useful as a dropper.

Holder for Cuspidor in Sick Room



A very important part of the sick-room equipment is a cuspidor. This, as a rule, is merely placed on the floor at the side of the bed, where it is easily upset, and where it is often impossible for the patient to reach it. The clamp shown in the drawing holds the cuspidor on the bedpost within easy reach of the patient, and where it is not easily overturned. The clamp is made from narrow strap iron or other metal, and is held to the bedpost by a small bolt, which allows quick adjustment to any height desired. The cuspidor can be slipped in or out of the spring ring very quickly.—John G. Pope, Worcester, Mass.

A Pet-Animal Carrier



A Carrier Enables the Owner of a Pet Cat or Dog to Take the Animal with Him on the Train or Street Car

Almost every owner of a pet dog or cat has occasion to carry it from place to place at one time or another. Unless these owners have at their disposal a conveyance with which they can carry their pets to the distant point, they are dependent on the railway or street cars for transportation, if the destination is beyond walking distance. Animals cannot be taken on the railroads unless they are carried in covered baskets, and those that are too large to be carried must be checked in the baggage car. On the city railways, animals that cannot be carried will not be transported.

The two photographs show a carrier which can be made very easily, and at little expense. It is very light, but serviceable and strong. The covering is made of strong canvas, heavy oilcloth, or similar material. The bottom of the carrier is made of a solid piece of wood. The sides and ends are also solid, but should be of very thin wood so as to keep the carrier as light as possible. Ventilating holes should be cut in the ends. The pieces for strengthening the slanting edges are cut from ½ by ¾-in. strips. The slanting pieces, or rafters, are nailed to the corner pieces and ends. The ridge pole is made 1¼ in. wide, and just long enough to fit in between the ends. One or two strong nails should be driven through the end walls into the ridge pole, thus making a very strong frame. The uprights should be rounded off so that the animal will not be injured if it should happen to strike them with any force. The edges of the ridge pole should also be slightly rounded for good appearance. A space about 4 in. long should be rounded nicely at the center of the ridge pole, as this part is to serve as a handle.

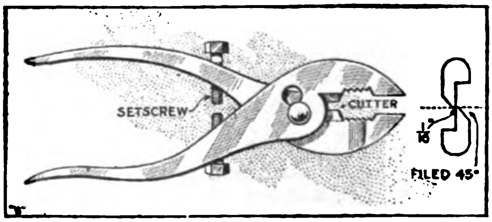
When tacking on the canvas, care should be taken to stretch it just as much in one direction as in another, in order to get it even. The canvas is tacked on all around the ends, as shown in the photograph. When it is stretched, a diagonal cut can be made across the openings in the ends, and the canvas folded over on the inside and glued. For the cover, sides, and bottom, one piece is used. The edges are folded in so that the width of the piece will just equal the length of the sides of the carrier. The edges of the cover are turned back and glued. Extra pieces of canvas should be glued on where the slits for the two screw eyes come; these screw eyes serve as simple but very efficient buttons or catches. A hole, 4 by 5 in., is cut into the canvas as shown, so that the handle can be grasped.—Frank W. Harth, New York, N. Y.

Removing Dents from Wood

Wood fillers, or putty, used to remove dents and bring the wood up to its original level, will make an unsightly bump if the wood afterward rises. The dents may be removed, even after the wood has been stained, by pouring boiling water directly on the dent for a period of five minutes, or whatever time is necessary to do the work. Unless the dent is very deep, or the fibers have been torn, the hot water will raise the sunken part almost to its original level. In the case of smaller dents, the result will be a repair which can hardly be noticed.—Charlie W. Dyer, Stratton, Me.

Pliers Converted into Saw Set

A pair of ordinary automobile pliers, which can be purchased for a few cents, is readily converted into a handy saw set. To make this conversion, file or grind off the corners of the wire-cutting part of the jaws to about the shape indicated in the sketch; then tap two setscrews into the handle, as shown, to form an adjustable stop. The two jaws are then brought against adjacent teeth of the saw which is to be set, thus taking the place of an expensive tool for this purpose.—Richard Schmitz, Birmingham, Ala.

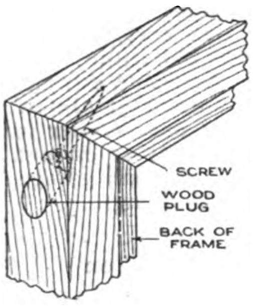


A Change Readily Made in a Pair of Automobile Pliers Forms a Handy Saw Set

Electric Fan Dispels Odors in the Kitchen

Preparing onions or horseradish is among the most disagreeable tasks of the housewife, due to the fact that these vegetables cause the eyes to smart and fill the workroom with disagreeable odors. By directing the air current from the electric fan in such a way that the odor is driven away from the work and toward an open door or window, much of the unpleasantness can be removed. The same method will be of aid in removing a musty or unpleasant odor from any room.—S. Zemon, Baltimore, Md.

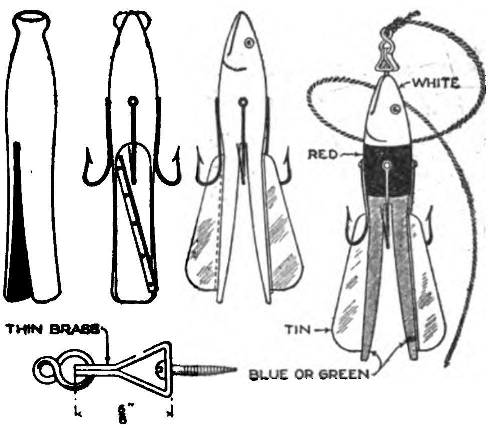
A Strong Picture-Frame Joint



The average amateur has a good deal of trouble to get the joints of a picture frame secured satisfactorily. A very strong joint can be made by boring a ½-in. hole in the side of the frame to a depth of about ½ in., and then, by working from this, boring a small hole at right angles to the miter and inserting a screw. The ½-in. hole is then plugged up with wood, taking care to have the grain of the plug run in the same direction as the grain in the frame. Glue the plug in and level off the wood afterward. By using this method, the joint is held so firmly that the finishing can be commenced immediately after the frame is put together.—Chas. Illingworth, Mission City, B. C., Can.

Effective Spinner Bait Made from a Clothespin

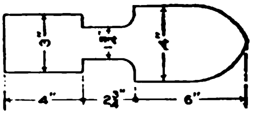
The popular spinner bait, which is rather expensive, can be made quite easily at home from an ordinary wooden clothespin. For the body of the bait, cut the head of the clothespin to roughly resemble that of a minnow. The outside of the clothespin legs should be cut flat. In order to secure the spinning, or whirling, motion, two metal wings, 2 in. long and ⅜ in. wide, are tacked to the fins of the clothespin. These are fastened at angles to the edges of the pin, that on one side being set at the opposite angle to the one on the other side. This setting of the wings causes the bait to spin when drawn through the water. In order to allow the bait to spin without twisting the line, a swivel connection is made between the fishline and the head of the bait. This is made from a piece of very thin metal, ¼ in. wide, bent as shown in the drawing. The hole for the nail which holds it to the bait is made large enough so that the bait turns freely. A piece of wire forms the ring to which the fishline is attached. Four hooks are fastened in the middle of the clothespin body and extend parallel with the body. The completed bait may be painted as desired, the usual method being to paint the head white, the body red, and the tail either blue or green.—P. P. Avery, Garfield, N. J.

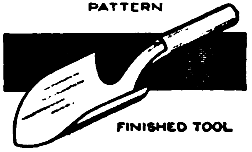


A Clothespin is Used for the Body of an Artificial Bait That Spins as It is Drawn through the Water

A One-Piece Garden Trowel

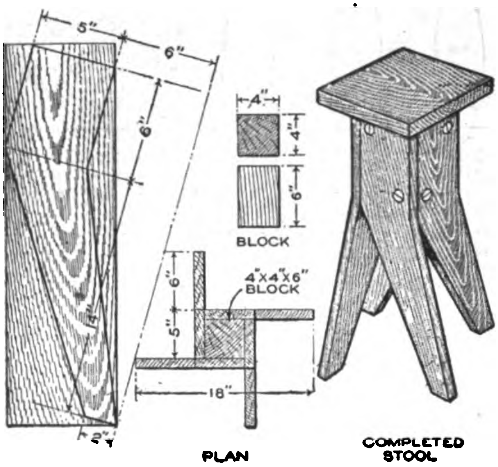
Some sort of serviceable garden trowel is needed by every person who tends to a flower bed or small vegetable patch. A very good trowel can be made from heavy-gauge sheet steel. First cut the steel to the shape and dimensions shown in the sketch. Then bend it as indicated, sharpen the edges with a file, and the trowel is complete. The handle may be made more comfortable to work with, if so desired, by wrapping it with adhesive tape.—C. A. Traxler, McKees Rocks, Pa.





A Queer Wooden Stool

This stool is much stronger and more serviceable than appears at first glance. It can be built from scrap ends of lumber.



Scraps of Lumber can be Made into a Somewhat Odd-Looking but Durable Stool

Cut out four legs from ⅞-in. stock, being careful that the grain of the wood runs as shown in the drawing. The rectangular end of these legs should then be screwed to a 4 by 4-in. block; when all four legs are attached to the square post, the bottoms of the legs will spread about 18 in. A suitable seat is then secured to the top of the post. If desired, the post can be drilled and threaded to take a seat similar to a piano-stool top, which can then be adjusted to the proper height for the person using it.

Old Magazines Used for Shingles

Needing some shingles for a kennel, a dog fancier conceived the idea of using old magazines in place of the high-priced wood or patent shingles. After two years of service, the shingles show that paper packed flat, as it is in a well-made magazine, will stand the weather for a long time.

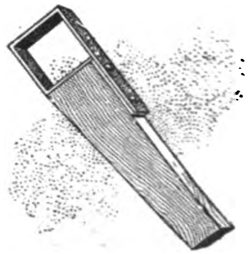
The magazines used were those printed on the best grade of paper, 9 by 12 in. in size. Most of these magazines are about ¼ in. thick, and a few pages can be torn from the back when necessary. Magazines of the size of Popular Mechanics were also used, but, in this case, each magazine was cut into two equal parts so that each copy made two shingles.

Paper is a wonderful nonconductor of heat, and using these magazines for shingles secured protection against cold for the dog kennel, and also was a sufficient protection against storm. Only 2 in. of the magazine shingles were laid to the weather, and the lower edge of each shingle was formed by the binding of the magazine. Ordinary shingle nails were used to secure the magazines in place. Both the roof and walls of the kennel were protected in this way. The result was a dog kennel that was very warm; absolutely no wind could get through it, and the roof kept out water in fine shape. For the roof, the best magazines were used, that is, those with a heavy cover of well-calendered, hard paper. The cover was placed upward.

There is no reason why many other buildings could not be made warm and dry by the use of magazines for shingles. Especially the side walls can be covered with this kind of shingle, which will remain in service nearly as long as those of wood. The dog kennel, when completed, was given a liberal coat of heavy paint. The paint stiffened the paper just enough so that each shingle was held in place, and was protected from the rain. From a short distance these magazine shingles could not be told from any other painted shingle. It would be an easy matter to go into one's garret and gather enough old magazines to shingle a small garage, stable, shed, or other outbuildings.

Wrench Made of Sheet Iron

A wrench, which will be satisfactory for light work on small nuts, can be made from a strip of sheet iron and a piece of hard wood. The dimensions depend on the size of the nut the wrench is to be used on, but the iron should be of rather heavy gauge, and at least ¾ in. wide. It is bent around the nut, and the ends are fastened to the hardwood handle with screws or bolts. While this wrench will not do for heavy work, it will be found useful where a great many small nuts of one size are to be tightened.—Elwood L. Glassford, New York, N. Y.

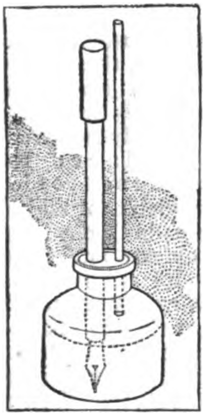


¶ For cutting light armored cable, a three-cornered file is preferable to a hacksaw.

Photographing Cracked Negatives

A cracked glass negative can often be copied, so that the crack does not show, by running a little glycerin along the glass until the glycerin fills the crack. A sheet of glass is laid on the surface of the negative, also with a little glycerin, to cause it to unite optically, and the negative can then be photographed, with the crack almost, if not quite, invisible.—H. J. Engel, New Braunfels, Tex.

Filling Fountain Pen by Suction



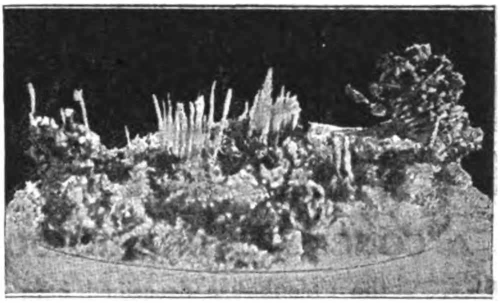
One way to fill a fountain pen not provided with a self-filling mechanism, without soiling the fingers, is to fit into the ink-bottle cork a small glass tube, as shown, and make another hole in it large enough for the pen barrel to fit in it tightly. Insert the pen, and adjust it until the lower end of the barrel is completely submerged in the ink. Now take the end of the glass tube between the lips, and draw in a long breath, so as to withdraw as much as possible of the air which is in the ink bottle. This will cause the air inside the fountain pen to flow out and bubble up through the ink, until the air inside the pen is reduced to the same pressure as that in the bottle. When the lips are removed from the glass tube, and the air rushes back into the bottle, its pressure forces the ink up into the pen, which is then withdrawn ready for use. While the exhaustion of air from the bottle by this method can by no means be complete, it was found by test that practically the same amount of ink was drawn up into the pen by this method of filling as would be dropped into it by using the ordinary fountain-pen filler.—J. Garrett Kemp, Stillwater, Okla.

Necktie Pressed without an Iron

A badly wrinkled necktie may be made to present a much better appearance by wetting it slightly and then drawing it slowly around a section of a hot steam or vapor radiator, which has been thoroughly cleaned beforehand.

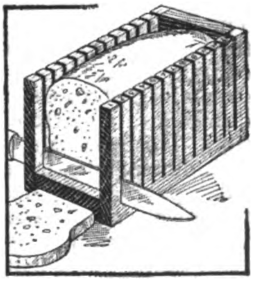
Silicates Form Chemical "Plants"

To make a "chemical garden," put 2 or 3 in. of sand into a glass fish globe, or some similar vessel. Then arrange, on the sand, some pieces of the sulphates of copper, aluminum, and iron. Pour over this a solution of one part of sodium silicate (water glass) to three parts of water. Let the globe remain quiet for about a week, after which a dense growth of the various silicates of the minerals will have taken place, in beautiful and varied colors. Finally the silicate solution may be replaced with clear water, to enhance the effect. This is done by passing a stream of water through a rubber tube into the globe until all cloudiness has vanished from the liquid inside it.

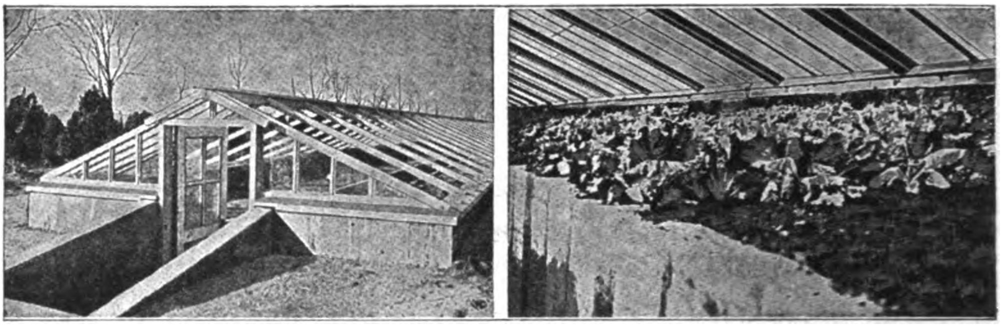


Silicates Deposited from a Solution Form Beautiful Flowerlike Shapes on the Glass Walls of the Vessel

Gauge for Slicing Bread



Cutting bread in slices of uniform thickness can be easily accomplished by using the bread gauge shown in the sketch. The gauge is a trough large enough to hold the average loaf of bread snugly. Its sides, which should be of fine-grained hard wood, 1 in. thick, are nailed to the bottom piece, which is 2 in. thick. Slots are cut in the sidepieces every 3/8 or 1/2 in., or closer if desired. The trough may or may not have end pieces. The gauge will be even more handy if the wood between the slots is numbered, as shown in the sketch, to enable the housewife to tell just how many slices she is cutting.—C. S. Cierpik, Urbana, Ill.

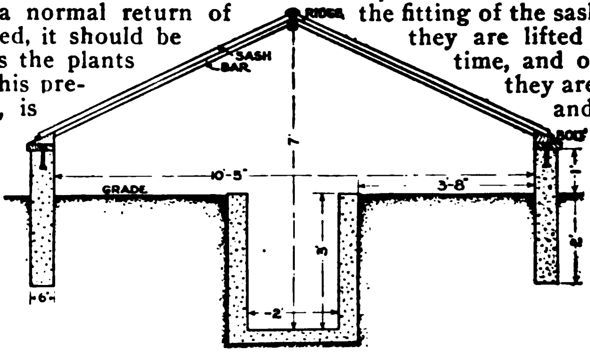


At the Left Is the Greenhouse Completed Except for the Sash, the Form of Concrete Stairway and the Entrance being Made Clear. The Right-Hand View, besides Giving an Idea of the Bench and Side-Wall Construction, Indicates the Growth of a Crop of Lettuce by the 20th of March, at Which Date the Picture was Taken

A CONCRETE GREENHOUSE THAT USES NO FUEL

SINCE the greenhouse described here has the virtue of requiring no fuel, it is really a combination of greenhouse, hotbed, and cold frame. While the plants in it will freeze in zero weather, the natural process of thawing leaves them unharmed. A thin layer of straw, or similar material, on the glass, to keep the sun from the frozen plants, retards the thawing and assures a normal return of circulation. If used, it should be left on as long as the plants remain frozen. This precaution, however, is seldom necessary. Snow makes the best of winter coverings, and should not be removed except by nature's hand.

The foundation and walls of the greenhouse are of concrete. The upper structure may be of cypress or redwood. The outside width is 11 ft. 6 in., the length depending upon the number of sashes required for a particular purpose or location. Hotbed sash, of the standard 3 by 6-ft. dimensions, is used. Fitting into the ridge pole, at the upper end, they rest at the lower end on the timber heading of the concrete side walls, and are readily removable. The height from the ground to the ridge is 4 ft. The center walk is 2 ft. wide and 3 ft. below ground level, reached by cement steps. This makes the clearance from walk to ridge 7 ft. Concrete side walls, 3 ft. high and 4 in. thick, join the walk at the bottom and confine the benches at the top. The outside walls are 6 in. thick and 3 ft. high, with one foot above ground and two beneath. The benches are the same level as the outside ground.



Cross Section of Greenhouse, Giving Dimensions and Locations of Walls, Benches, Sash, and Finished Structure: Bolts for Fastening Headers to Outside Walls are Shown in Place

Proper ventilation must be provided in the fitting of the sashes. In the spring they are lifted out, a few at a time, and ordinarily by May they are entirely removed and replaced by cheesecloth, which provides shade for the plants, and bars out insects. Gradual removal of the sash hardens the plants to the outside weather. Being adapted to crops of many kinds, the greenhouse may be kept occupied all year. Radishes, beets, and lettuce in March or April; blooming plants and summer vegetables, such as tomatoes and cucumbers, in May; leaf and head lettuce in August, and in November, cabbage and cauliflower, for spring transplanting, offer opportunities to secure several crops a season.

As the length is left indeterminate, the cost of such a structure must be calculated by the running foot. It should average about $6, but would, of course, be largely influenced by local labor charges.

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Gluck as Nedda

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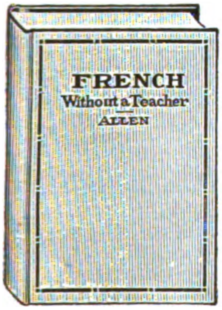

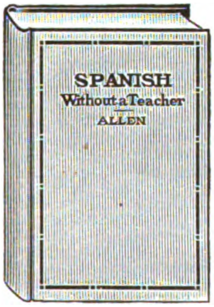

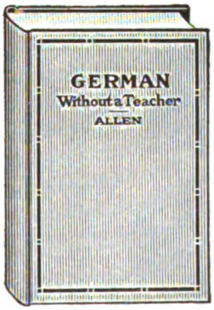

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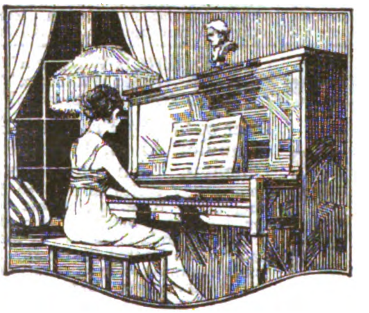

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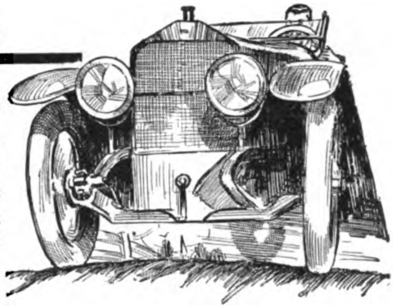

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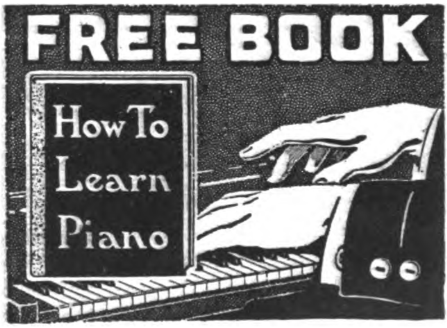

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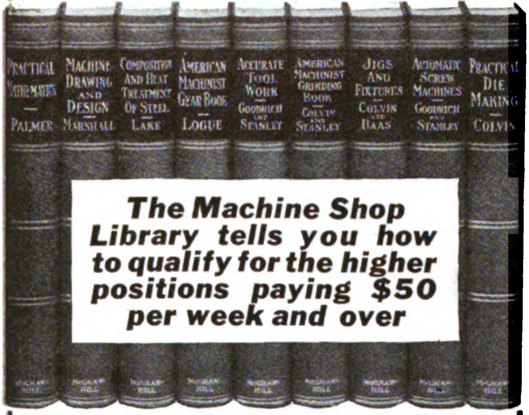
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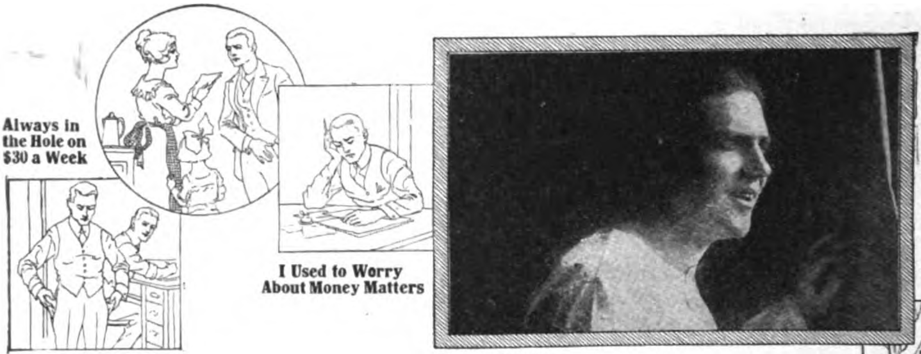

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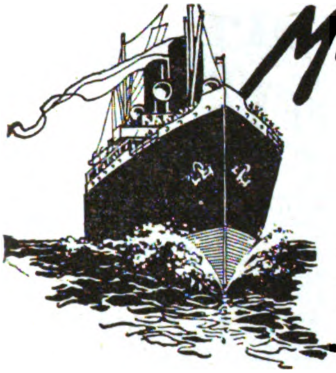

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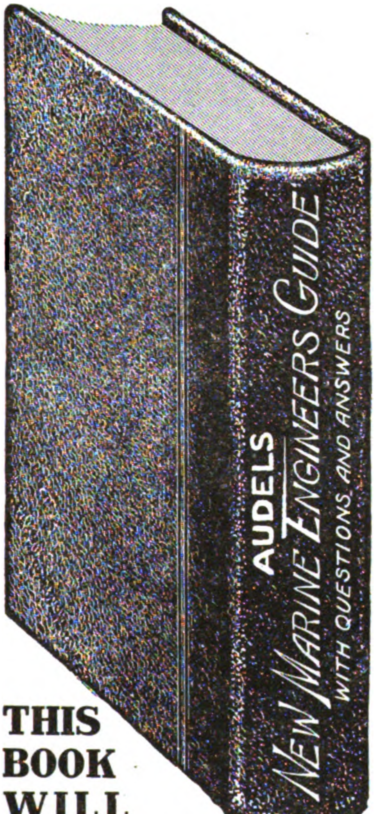

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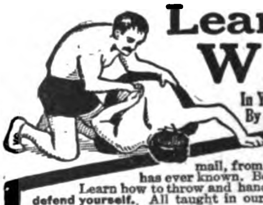

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GREER COLLEGE OF MOTORING AUTOMOBILE, TRACTOR AND AIRPLANE ENGINEERING

Here Is *Your* Opportunity to Win Success

By ERWIN GREER

To Ambitious Men Everywhere:

I want to have a plain talk with every reader of Popular Mechanics who is interested in the Automobile, Tractor or Airplane business. I wish especially to talk to the man who is ambitious to "make good" and can see further ahead than the end of his nose.

You cannot make a mistake in selecting either the Automobile, Tractor or Airplane business as your life work. There is no other field in which you will find a better future. You want a better job; you want a chance to go into business for yourself a little later on—and there is no reason why you should not succeed in your ambition. Let me give you some interesting facts—

First, you must have specialized knowledge of some kind if you want to get on. Second, you must get the best possible training your ability and means will permit. Your earning power depends on your training. The best pays best in the end.

Over 15 years of my life have been given over to the building up of Greer College of Motoring and starting ambitious men on the road to success. These were years of hard work, constant study and planning to make my school the best of its kind. I was never keen on making Greer College of Motoring "the largest school in the world"—but I never let anything stand in the way of making it the best.

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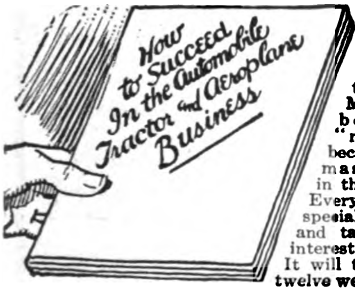
How to Succeed In the Automobile Tractor and Aeroplane Business

GREER COLLEGE
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Dept. 16, 1519 Wabash Ave., CHICAGO

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"Learn by doing" is the basic principle of my master method. It's just like going to Manual Training School. It is not necessary for you to have a college education—all you need is plain "horse sense" and the ability to read and write English. You do not need any previous experience of any kind. If you will promise to work hard, I will guarantee that you will succeed.

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As the country is gradually returning to normal conditions, the demand for trained men is increasing by leaps and bounds. If you can "deliver the goods" you can practically pick your job and command your own salary. If you don't want to work for some one else, you will find thousands of splendid locations to go into business for yourself, in all parts of the country. My "personal service department" will help you get started right.

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You owe it to yourself to investigate—don't delay—**act today.** Yours for Success,

Erwin Greer

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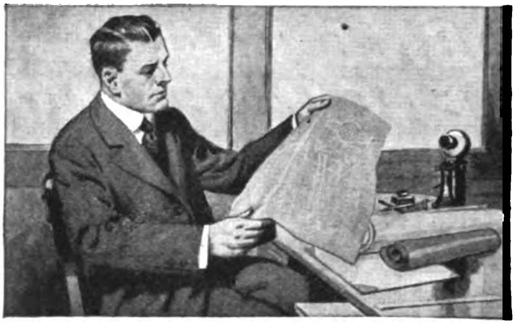

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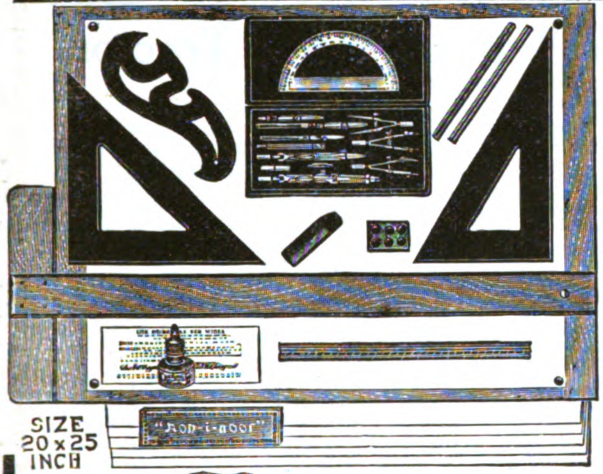

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How An $18-a-Week Clerk Became a $150-a-Week Salesman

The Experience of a Man Who is Now Earning More Every Day Than He Formerly Made in a Week

By Lester E. Smith

NOT very long ago, D. F. H., of New London, Conn., was earning only $18 a week, with little prospects of getting more.

He was dissatisfied and discouraged—tired of dubbing along at wages that allowed only a dull and drab existence, with none of the real pleasures of life.

Finally he decided to make a change. Within just a few months, although he had never had any experience, he stepped into a new job that paid him $600 a month—**more per day than he had formerly made in a week.**

In addition, his new work is absorbingly interesting. He is constantly meeting new people, constantly visiting new towns and cities, and seeing new sights. He travels on the best trains, stops at the best hotels, eats at the best restaurants.

What was the secret of D. F. H.'s quick rise? How did he jump from a poor job into a good one—and in an entirely new line—without having to work his way up through the slow process of experience?

D. F. H.'s Simple Secret

The explanation is simple. There was no luck about it. The first thing D. F. H. did was to get a line on the possibilities in different kinds of work. And it didn't take him long to discover for himself that men who know how to *sell* are the ones who are making the most money, getting ahead the fastest, and getting the most out of life.

The basis of all profit in business is *sales*—the man who brings in the orders is always liberally paid, because orders mean *profits*. **That is why salesmen earn all the way from $2,000 to $10,000 a year and expenses**—many of them more. And that is why salesmen are so often selected for partnership and executive positions—they are the *profit producers*—the *life-blood* of business.

But how was D. F. H. to get his start? He soon found that lack of experience was no obstacle. About that time, he happened to hear of the National Salesmen's Training Association—an organization of top-notch salesmen that in the last twelve years has trained thousands of men for high-salaried positions through spare time study at home. He found that instead of having to start out "green" at a small salary and learn through the hard knocks of experience, he could learn salesmanship from A to Z from a few simple and easy lessons, and start at a good salary. He also found that he wouldn't have to give up his job as clerk until he secured a position as a traveling salesman—and that through its Employment Bureau, The National Salesmen's Training Association was ready to assist him in his choice of positions **without any charge.**

"Salesmen get the largest salaries because they are the ones who bring in the orders—dividends depend upon their ability."

Outselling Veteran Salesmen

Thus in a few weeks of easy and fascinating spare time study, D. F. H. learned secrets of selling that many veteran salesmen *never* discover, even after a lifetime of experience. Through the simple lessons sent him by the N. S. T. A., he got the coaching of men who have been "through the mill"—men who have sold millions of dollars' worth of goods. Through their help, he was able to start in where many salesmen leave off.

And the big point about D. F. H.'s experience (his full name and address will be furnished on request) is that it is a typical example of the way thousands of men—clerks, bookkeepers, printers, mechanics, farm boys, and others—have been able to change from poorly paid work to highly paid positions as salesmen without any previous experience. It is *knowledge* that counts, not experience. For example, G. W. K. had never made more than $60 a month before taking the N. S. T. A. course. In a recent letter he writes: "Last week I cleared $300, and this week $210." Another man writes: "Why should any man work for $25 a week when he can make that much in one day? I made $300 last week and am doing fine."

Free Book Shows Just How They Did It

What these men have done you can do. You don't need to know the first thing about selling to begin—the N. S. T. A. trains you from the ground up—in your spare time, without giving up your present position until you are ready to start out selling—**and then through its Employment Bureau you can secure a good position.**

If you are ambitious to earn more money, to see the world, to get more out of life, then at least investigate—it will cost you nothing to find out how this Association can help you. Simply send your name for interesting free book—it shows why salesmenship offers such wonderful opportunities—**why the demand for salesmen is always ahead of the supply**—explains just how we qualify you for any line of selling—tells about our Employment Bureau and the **many good positions now open.** Includes letters from hundreds of men we have trained. Send for the book today, then judge for yourself. Mail the coupon or just write on a postal card.

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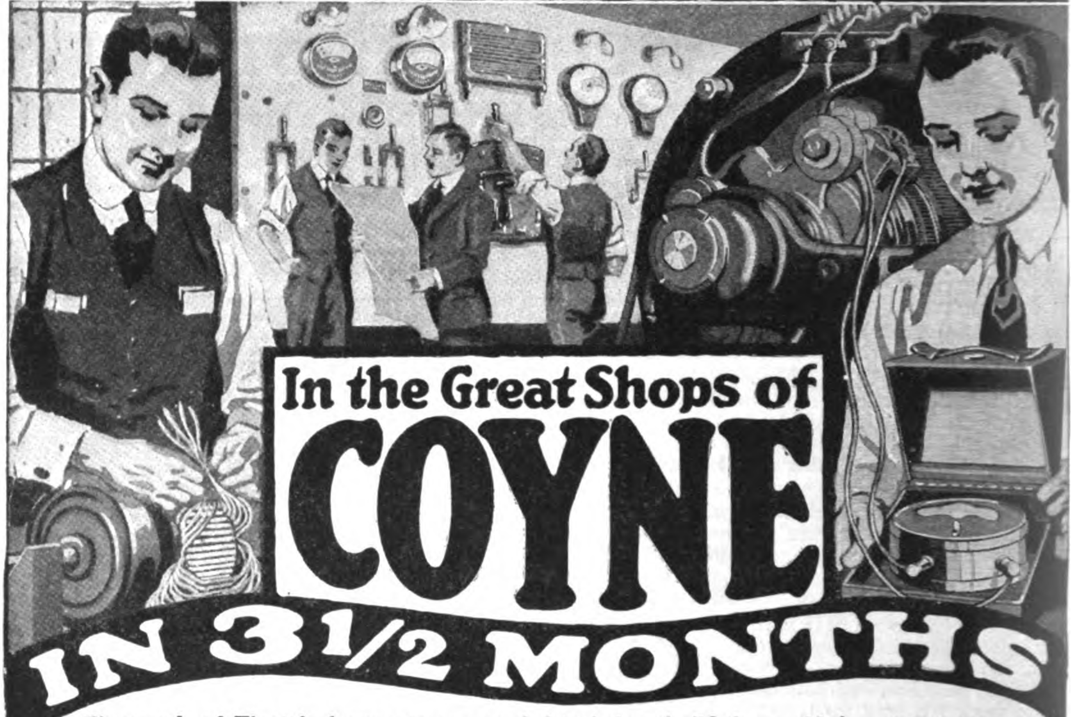

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Popular Mechanics Magazine, Chicago, Ill

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(Signed) L. F. Ostrander.

AUTOMOBILE SUPPLIES

LIBERTY Plane, Radiator ornament, hand painted aluminum. Any car $1.00. It's simply great. See page 150. Defender Auto Lock Co., Detroit, Mich.

AUTOMOBILE parts for most any make and model car. We save you 10 to 90% of the original cost. Here is a partial list of cars we can supply parts for: Buick, Brush, Case, Chalmers, Chandler, Chevrolet, Cadillac, Carnation, Detroiter, Dodge, E. M. F., Flanders, Ford, Hudson, Hupmobile, International truck, Interstate, Jackson, King, Krit, Little, Marmon, Metz, Maxwell, Michigan, Mitchell, Moon, Oakland, Overland, Ohio, Paige, Rambler, R. C. H., Regal, Reo, Stoddard-Dayton and Studebaker. Bosch, Splitdorf and Remy magnetos. High-tension magnetos for Ford, Maxwell, etc., K. W. high-tension magnetos, with impulse starter for tractors. Storage batteries, tires, tubes, complete engines, rear axle parts, radiators, Prest-O-Lite tanks and automobiles. We ship orders to all parts of the world. Everything sold with a money back guarantee. You are the judge. Auto Tire & Parts Co., 207 Broadway, Cape Girardeau, Mo.

LUBRICANT Carbon Remover takes the knock out of the Motor. Lubricates the motor, and a guarantee with every can to take out the Carbon, or money refunded, harmless to use, easy to start. Every can is more than paid for itself in more mileage per gallon of gasoline. $1.00 per can. Agents wanted. Paul Vandenberg, 6 East 111th Place, Chicago.

TIRES — Double Tread. Guaranteed for good service. Big—strong, 30x3 tires, $6.25; 30x3½, $7.75; 32x3½, $8.75; 33x4, $10.25; 34x4, $10.75; 35x4½, $12; 36x4½, $13.25; 37x5, $14.50. Big saving on other sizes and tubes also. Trade in your old tires. Discount to dealers. 10% deposit required on C. O. D. orders. Send for list now. Max Liben & Co., 205B West 48th St., New York.

DOUBLE Service Tires. Guaranteed to give good service. Size 30x3, $5.50; 30x3½, $6.60; 33x4, $9.00; 34x4, $9.00; 36x4, $9.00; 36x4½, $10.00; 36x5, $11.00; 37x5, $11.00. Non-skid $1.00 extra, 20% required on all C. O. D. orders. State if Q. D. straight side or clincher type. 5% discount if cash accompanies order. Also special discount to dealers. I also carry a full line of New First and Factory blemished tires and tubes at $9.00 and upwards, tubes at $1.50 and upwards. Prices will be sent on request. Kindly state size. I. Jaffess, 1319 5th Ave., New York. Branch, 241 West 54th St., New York.

DOES your car show that it belongs to you? Beautiful transfer letters, easily applied to your car. Six letters with needs to apply 50c. F. R. Britt, Box 192, Fairmont, W. Va.

VULCANIZE on Anderson's Famous Vulcanizer. See advertisement, page 149.

TIRES—3,500 mile guarantee. There is no tire on the market to equal the Kimball Cord Type Tire at the ridiculous price we quote. See display ad page 153. Kimball Tire & Rubber Co., Inc., 2204-MP, Michigan Ave., Chicago.

STARTER Steel Ring Gears for fly wheels. Starter Steel Ring Gears for fly wheels. Starter Steel Ring Gears for fly wheels. Kent Auto-Parts Co., Denver, Colo.

BUILD a small car; we supply all parts ready to assemble. See our advertisement page 152. Tribune Engineering Company, Owego, N. Y.

HOW to operate and repair automobiles. Book 25c. Devine, M409 W. Division St., Chicago.

STRONG Double Tread Tires; Guaranteed for 3500 Miles; Standard Guarantee. Reconstructed by our wonderful process. Reliner free with each tire: 30x3, $5.50; 30x3½, $6.50; 31x3½, $6.75; 32x3½, $7.00; 34x3½, $8.00; 31x4, $8.00; 32x4, $8.25; 33x4, $8.50; 34x4, $8.75; 35x4, $9.00; 36x4, $10.00; 38x4½, $10.25; 34x4½, $10.50; 35x4½, $11.00; 36x4½, $11.50; 37x4½, $12.00; 35x5, $12.50; 36x6, $12.75; 37x5, $12.75; 37x4, $13.00. Tires shipped C. O. D. subject to examination. Send $2 deposit, or 5 per cent off when full amount accompanies order. State whether straight sides or clincher rims, non-skid or plain tread. Strong Tire and Rubber Co., 3019 Michigan Ave., Dept. P, Chicago, Ill.

MAKE Big money installing farm lighting plants. Battery charging outfits, supplies. Get our special demonstrating offer and agency plans at once. Acme Engineering Company, Louisville, Ky.

BE economical and save money. Guaranteed good service on double-tread tires size 30x3, $5.00; 30x3½, $6.00; 30x4, $8.00; 30x4½, $9.00; 30x5, $10.00. Non-skid, 50c extra. 10% required on C. O. D. orders. State if Q. D., straight side or clincher type. 5% discount cash accompanies order. Special discount to dealers. Economical Tire Co., 611 Bergen Ave., N. Y. City.

INDIVIDUAL wind shield for automobiles. Ernest Schubert, Vliets, Kans.

HYDRONIZER — Insures clean plugs, consumes carbon, saves gasoline and repairs. Money-back guarantee. For all cars. Fords do 34 miles to gallon. Attractive proposition for agents. Free Literature. Friestedt Manufacturing Company, 2932 West Lake Street, Chicago.

STANLEY Steamer Owners get list! Used boilers, burners, engines, automatics, gauges, every imaginable fitting. Reduced prices. Inclose stamp. "Doc" Paine, Denver, Colorado.

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ILLINOIS Oil Company purchased "Gidz" four years ago for resale in their filling stations; we still receive their requisitions, because "Gidz" increases power, mileage, and eliminates carbon. "Gidz" saves gas and money. One can prepaid. One Dollar. Distributors wanted. "Gidz," Galesburg, Illinois.

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MAGNETOS, generators, starters and motors bought, sold and repaired. Thomas W. Lydon, 321 Pearl Street, Baltimore, Maryland.

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SPEED bodies, top recoverings. Duplicate parts and Accessories for Fords. Splendid quality, bargain prices. Allied Steel Products Company, Aurora, Illinois.

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AGENTS—Over 200% Profit. Sell Magic Crystal. Quickest seller, fastest repeater on earth. No talking—free samples sell it. Big weekly repeat-order business. We guarantee the sale of your entire order. Get sample, proposition and Cash-Quality Credit Plan—Sell your customers on credit and run no risk whatever. Diamond Spear Co., Texarkana, Texas.

JUST Out, clever, practical, absolutely new Tie-Form. Everyman needs. You will be delighted. Big profits. 30c for sample. International Supply House, 39 W. Adams St., Chicago.

AGENTS, either sex, make $100 week and up selling complete History of War by Gen. Pershing and others. Official illustrations, maps, etc., 600 pages; sells $[illegible] and $2.50. Immediate shipments; commission 50%; Credit given; outfit Free. Bird Syndicate, Pub'rs, Dept. B, Madison, Wis.

IF you own a Ford you can earn $60 a week selling the Adapto-Tractor attachment. Details free. Write The Geneva Tractor Co., Dept. P, Geneva, Ohio.

LARGE Profits can be made selling Eddy's Combination Automobile Operator's License Carrier and Key-ring. Just roll up your license and carry it with your keys. Every automobilist needs one. Send [illegible] cents for sample. H. R. Eddy, Meriden, Conn.

AGENTS, Discharged Soldiers. Ford accessory which sells on sight. Offers you biggest opportunity of your life to make money. One agent made $187 one week. Exclusive territory. No competition. Motor Products Co., Indianapolis, Ind.

SELL 24 packages seeds of the wonderful Sensitive Plant at 10c each and get a genuine Panama Hat Free, for boys, girls and grown-ups. Order today. Send no money. The Porto Rico News Co., San German, Porto Rico.

WE Start you on the road to a successful and independent career. You can't fail—$8 to $15 a day the year around. Exclusive territory — direct representative. Largest manufacturing concern—exceptional products—not sold in stores. Needed by every member in every home—repeat orders all year round. This is no time for doubters—come join this successful organization at once—Men and women—We are back of you with thousands of dollars. T. H. Snyder & Co., 5 Third St., Cincinnati, O.

CONNECT with real money-makers: 3[illegible] specialty manufacturers advertise in Specialty Salesman Magazine. 300 Safe propositions to select from. Chuck full inspirational selling talks by best salesmanship writers. Exposes frauds, forces square deal, 100 pages; $2.00 yearly, three months trial 25c. Read current issue; if not satisfied, money refunded. Robert Hicks, 43[illegible] Caxton Building, Chicago.

"ZIP-CLEAN"—cleans dirt clean out of everything!—rugs, carpets, especially. Cleaning Time Now! Wonderful money maker—sold on trial. 25c, 30c sizes. Merford, 504 Northwestern Building, Chicago.

I WANT 100 men and women to act as my agents and take orders for Comer raincoats, raincapes and waterproof aprons. I paid Eli Bridge $88.95 for orders taken during his spare time in one week. Cooper made $314 last month. Wonderful values. A dandy coat for $4.98. Four average orders a day gives you $2,500 a year profit. No delivering or collecting. I'll give you a sample coat and complete outfit for getting orders. Hurry. Write for my liberal offer. Comer Mfg. Co., Dept. U-112, Dayton, Ohio.

AGENTS: A brand new hosiery proposition for men, women and children. Must wear 12 months or replaced free. All styles, colors and fancy stripes. You can sell at less than store prices. Every home a prospect. Write for samples. Thomas Hosiery Co., 3362 North St., Dayton, Ohio.

AGENTS—Snappiest household line on earth. Red-hot sellers, steady repeaters—100% profit. 500 light-weight, fast-selling, popular-priced necessities. Agents outfit free. Get busy—quick. Write today; postal will do. American Products Co., 594 American Bldg., Cincinnati, O.

BUILD a genuine Choraleon Phonograph and save over half. Fine profits building and selling. We furnish motors, tone-arms and necessary parts. Send for our catalog and free blueprint offer. Choraleon Phonograph Co., 2206 Monger Bldg., Elkhart, Ind.

NEW article, big seller, 3 samples for 25c. Ralph Brandt, Trenton, N. J.

MAKE $10 to $30 a day cleaning wall paper; guaranteed formula, instructions and everything complete to start, 78c. Particulars free. Nelsen, Box 496, Colorado Springs, Colo.

COIN money selling phonograph attachments. Sample $1.25. Write now. Pla-More Phonograph Specialties, 21 E. Van Buren, Chicago.

LYNER Tyres, inside protectors for automobile tires; guaranteed against blowouts and 90 per cent of punctures; transferable. Exclusive territory; big profits. Write for sales-guarantee proposition. Pelletier Rubber Company, Box 322, Cincinnati, Ohio.

AGENTS wanted to sell Eggnit—a pure food substitute for eggs. Easy selling article—big profits—quick repeater. Stuart & Co., 16 Main St., Newark, N. Y.

AGENTS: We have after years' experimenting invented the only non-carbonizing oil-gas producing burner on the market for heating, cooking and baking; guaranteed one year. Atras Mfg. Co., 1608 Fulton St., Chicago.

STRICTLY high-class service. Manufacturing instructions and tested formulas in every line. Latest Automobile specialties, Washing Compounds, Egg Savers, Luminous Paints, Farm Specialties, Toilet Preparations, Chemical Analyses, Matching of Commercial Samples, Special Formulae, Engineering service, Advertising copy, Boxes, Labels, etc. 23 years' manufacturing experience. Catalogue free. Investigate. Industrial Sales Service, 73 Washington, Memphis, Tenn.

COSTS half cent. Sells for dime. Get facts. D. Gilson, 207 S. Sturgeon, Moberly, Mo.

REAP harvest selling farmers. Particulars free. Keating, No. 507 12th Street, Detroit.

WONDERFUL New Chemical. $1 package equals 50 gallons Gasoline. Eliminates Carbon. 50% more mileage, power, speed, guaranteed. Whirlwind seller. Auto owners buy on sight. 100% profit. Repeater. Demonstrating package, terms, territory, 10c postage. Myers & Co., 28 Baird, Cambridge, Ohio.

AGENTS earn $30 and up per week in spare time selling "Maketla Guaranteed Woolen Army Blankets." 100,000 sold U. S. Government; not one rejection; every home and club a prospect; sells for $4.00; write for full information; greatest blanket value on the market. Maketla Co., 611 R-49 Drexel Bldg., Philadelphia, Pa.

AGENTS—Our Spray Auto Washing Brush sells to all auto owners. Attaches to garden hose. Retails $3.50. Commission 40%. Sample $2.00 postpaid. Sanitax Co., 2312 Wabash Ave., Chicago.

IDEAL Sideline. Business men buy on sight. $1.00 seller, 400% profit. K. Home, 1957 Warren, Chicago

AGENTS — $50.00 daily selling our leatherette soldiers' discharge paper holder. Military emblem stamped in gold. Retails 50c. To you, $3.00 doz. Sample 35c prepaid. Write today. Goldsmith Novelty Co., Dept. 10, 160 No. Wells, Chicago, Ill.

AGENTS: Sell Neverfail Iron Rust and Stain Remover. Huge Profits. Big line. Sample. Write today. Sanford-Beal Co., Inc., Newark, N. Y., Dept. 6.

AGENTS wanted to sell sanitary necessity for every community—large sales, liberal commissions. In replying give experience, goods sold and territory desired. Dail Steel Products Company, Lansing, Mich.

SALESMEN, Local and Traveling, wholesaling, retailing, appointing sub-agents for automobile specialty. Ten to fifty dollars profit per day for live wires. Sold and installed in two minutes. Write for sample. Pacific Auto Necessities Co., 610 Lynch St., St. Louis, Mo.

A $2.50 PREMIUM with every $1.98 sale and 70 cents profit for you means Big Daily Profits. Free Sample. Box 500, Shreveport, La.

AGENTS Sell "Hy-Grade," a Carbon Remover of Genuine Merit. 100% Profit. Repeater. Fifer Chemical Co., Marietta, Ohio.

AGENTS sell "In-Ten-So" Ford Headlight Regulators. Every Ford Owner buys on sight. (See our ad under "For Ford Owners.") Immediately write for territory. Continental Auto Supply Co., Dept. H, Davenport, Iowa.

BIG Profit selling Jubilee Spark Intensifier. Banishes spark plug trouble. Sells like wildfire. Exclusive territory. Write quick. Jubilee Mfg. Co., Omaha, Nebraska.

BEGINNERS—"Complete Mail Order System." D-Box 1005, Atlantic City, N. J.

AGENTS—Send for sample "Fretnot"—the washday wonder. Be convinced you can do a whirlwind business. You can clear at least $20 to $100 weekly, according to spare or whole time. You don't have to talk: if she doesn't buy at sight, leave sample; she will be looking for you long before you are able to make the rounds again. Samples furnished free. Premiums for your customers. Exclusive territory guaranteed to agents who can produce. Credit given. Don't call. P. M. Motter & Sons, 3213 Warren Ave., Chicago.

AGENTS make $10 per day selling photos of Pershing—Foch—Wilson—Lincoln—Washington. Sets sell at sight, 50 cents. Send 20c for sample set. The National Bank Note Co., Charles Bldg., 210 St. Clair Ave., Cleveland, Ohio.

300% PROFIT: Agents clearing hundreds weekly. New Washing Compound. Wonderful seller. Big repeater. Nature's mightiest Cleanser. Send for proof; free sample. Fred B. Mitchell, 1314 E. 61 Street, Chicago.

AGENTS: Catchiest Novelty Invented! Aerial Balloon makes youngsters wild with joy. Immensely interesting. Wonderfully quick seller, large profit, unlimited territory. Sample 5c. H. Marui & Co., 33 Broadway, New York.

AGENTS with Fords. Clear $50 to $100 weekly. A. A. Jackson, 1818 Curtis St., Denver, Colorado.

AGENTS—Ideal Steak Tenderer is greatest money-maker on the market. Makes tough steak tender as porterhouse. Housekeepers buy on sight. Over 200,000 in use. Samples free. Tyler Manufacturing Co., Dept. A, Muncie, Ind.

AGENTS make $50 weekly selling Accident and Sickness Policies for $10 yearly. Pays $5,000 death, increasing to $7,500; also $25 weekly benefit for accident or sickness. Quick claim settlements. Permanent income from renewals. $100,000 deposited with state. Address Insurance Co., Dept. K, Newark, N. J.

AGENTS: Big profits selling our New $2.50 Automatic Adding Machine. Quick sales. Ten daily easy. No competition. Anyone having adding to do is positive customer. You'll be glad you wrote us. Bassett Company, 1458 W. Hollywood Ave., Chicago.

TOURIST Phonograph. Buy direct. Save middleman's profits. Write for further particulars. Local representatives wanted everywhere. Colman Mercantile Co., 4421 Manchester Ave., St. Louis, Mo.

MIRACLE Motor-Gas amazes motorists. 3c worth equals gallon gasoline. Eliminates carbon. 300% profit. Isom, Idaho, wires: "Ship 500 packages. Made $70 yesterday." Samples Free. Chas. A. Butler, Sec'y, Dept. 73, Toledo, Ohio.

AGENTS—Big Pay and Opportunity to Earn Automobile introducing wonderful gasoline saver, antifreeze, puncture-proof, five year spark plugs and other economical auto necessities. Outfit free. L. Ballwey, 189 Sta. F., Louisville, Ky.

NOW is the time to sell our Cartridge picture frame; sells on sight for One-fifty, sample one dollar; nothing like it on the market. Benko, 117 East 15th St., New York.

SIGN Letter Agents and Painters: 500% Profit Gold and Silver Sign Letters for Stores and Office Windows. Anyone can put on. Big demand. Free samples. Metallic Letter Co., 431-D N. Clark St., Chicago.

WORLD'S Fastest Selling Auto Accessory! County Distributors wanted; write today. G. L. W. Spring Oiler Co., San Diego, California.

LARGE Manufacturer Wants Agents to Sell guaranteed rainproof coats; prices defy competition; exceptional inducements; enormous profits; no schemes; we deliver and collect; outfit free. Aerco, 121-123 Canal St., New York.

A WHIRLWIND seller for man with auto. Our big Six-In-One tool, the Handy Worker: comprises anvil, vise, pipe vise, drill press, corundum grinder and cutting hardie. Weight 90 pounds. Sells for $20 with fine profit to you. Always pleases. Every farmer, janitor, plumber, private or public garage, small shop, etc., a prospective buyer. No trick to sell it and big money to be made. Write Chicago Flexible Shaft Company, Dept. S. O., 5600 W. 12th St., Chicago.

A NECESSITY That's Different. High-grade Umbrella that can't wear out. No wires to break and punch holes in the cover. Ball and socket principle. A broken rib can be replaced in a moment's time. (We furnish ribs free.) Covered with best wearing quality umbrella fabric. Fitted with detachable or regular handles (your customers' choice) of newest design. You will find The Moulton easy to sell and "The Best Umbrella value obtainable." Send $3.50 for Agents' Sample Umbrella and Selling Outfit, delivered. Exclusive territory and big money making proposition to Live Agents. Secure your territory at once. Money refunded if you are not delighted with sample. The Moulton Umbrella Company, 606 Main St., Wilmington, Ohio.

AGENTS make 500% profit handling Auto Monograms New Patriotic Pictures, Window Letters, Transfer Flags and Novelty Signs. Catalog sent Free. Hinton Co., Star City, Ind.

AGENTS—Quick seller. Big profits; California Rosebeads, selling like hot cakes. Hustlers coining money. New Stuff. Free catalog. Mission, 2819PM, W. Pico, Los Angeles, Calif.

AGENTS are making money with our line of Patriotic pictures, portraits, frames, novelties. Catalogues free. McCormick Co., 815 West Superior St., Chicago.

QUICK selling, newly patented and universally useful invention. Sells any time, anywhere, anybody. Supply carried in pockets. Cost 3½c each, retails 10c. Fine sideline. Send 10c for sample and literature. H. G. Martin, 51 Cliff Street, New York City.

ENORMOUS Profits selling Duo Guaranteed Products. Easy sales at every house. All or spare time. Outfit Free. Write Quick. Duo Co., Dept. H, Attica, N. Y.

REMARKABLE Stretching Cuff Links. Cuffs may be raised over elbows instantly without unbuttoning. Invisible and durable. Great convenience. Handsome profits for high-class salesmen selling direct to wearer. Master Jewelers Corporation, Sheboygan, Wisconsin.

KEROSENE Gas Burners in Cook Stoves, stop use of wood or coal. Patented. Agents getting rich. The Vapor Gas Burner Co., Desk 8, Columbus Ohio.

AGENTS—Sell rich-looking imported 36x68 rugs, $1 each. Carter, Tenn., sold 115 in 4 days. Profits, $57. You can do same. Write for sample offer selling plan; exclusive territory. Sample rug by parcel post, prepaid, $1.19. E. H. Condon, Importer, Stonington, Maine.

AGENTS—If you want to average $10 daily, sell a high-grade line of combs, brushes, mirrors and other novelties in Ivoryware. Direct from factory to consumer. Enormous demand. Particulars free. Yaneco Ivoryware Co., Leominster, Mass.

AGENTS make $100 monthly selling our 500 handy household articles. Catalogue free. Scheff Company, Desplaines, Ill.

AGENTS—New Invention Puzzles World; wonderful chemical cloth; one rub over rain, snow-blurred auto windshield, street car or engine window, presto! glass stays clear 24 hours; can't blur; agents making $120 weekly. Security Mfg. Co., Dept. 89, Toledo, Ohio.

WONDERFUL Adding Machine—Seven-column capacity—retails for one dollar. Sells itself everywhere. Most offices purchase several. Sensational agency proposition. L. J. Leishman Co., Dept. E, Ogden, Utah.

EASY, pleasant work for Mechanics, Shop Men, Clerks, during spare hours; will add many dollars to their salaries. Also want persons who can give full time. Big wages assured. Novelty Cutlery Co., 67 Bar St., Canton, Ohio.

NEW Invention, Big Seller. Devlin Company, P. O. Box 438, Newark, N. J.

AGENTS—Edring's Herb Tablets for constipation make everlasting customers. Control the sale of this Herbal Remedy in your territory. Jet Pharmacal Company, Allentown, Pa.

AMAZING New Invention, Marvelous Adding Machine. Retails $10. Adds, subtracts, multiplies, divides automatically. Does work of $300 machine. Five-year Guarantee. Offices, stores, factories buy from one to dozen. Every demonstration sells. Liberal profits. Write quick for protected territory and trial offer. Calculator Corporation, Grand Rapids, Mich.

DROP Everything Else. Sell Guaranteed Silk hosiery and underwear all or spare time, direct from factory to consumer. Big money maker. Big commissions. Prompt deliveries. C. & D. Company, Dept. 12, Grand Rapids, Mich.

PATENTS—Write for our free illustrated guide book, "How to Obtain a Patent." Send sketch or model for our opinion of its patentable nature free. Highest references. Prompt attention. Reasonable terms. Victor J. Evans & Co., 163 Ninth, Washington, D. C.

PORTRAIT Agents: Our goods will make you big profits. Delivery guaranteed. Rejects credited. Prompt shipments. Send for latest catalogue and prices. Adam J. Kroll & Co., 602 Blue Island Ave., Chicago, Ill.

VULCANIZING auto-tires growing profitable business, especially now. Easy to learn. Instruction book $1. Plants $50 up. Catalog free. Equipment Company, 370 8th St., Cincinnati, Ohio.

"RADIO" Luminous Paint brighter than ever. Replaces expensive Radium Compositions. Large can $1.00. American Luminous Products Co., Huntington Park, Calif.

GASO-TONIC will immediately give full efficiency to poor gasoline. Eliminates carbon. More power. Greater mileage. Easier starting. Absolutely harmless. Good at all times, but absolutely necessary during cold weather. Gaso-Tonic Company, Cincinnati, O.

AGENTS: Big profits. Best and cheapest window letters made. Easily applied. Dime brings five samples. Particulars free. Stalbrite Co., 1115 Second Ave., New York.

AGENTS—Make a dollar an hour. Sell Mendets, a patent patch for instantly mending leaks in all utensils. Sample package free. Collette Mfg. Co., Dept. 404-B, Amsterdam, N. Y.

FEATHER Flowers, the all-purpose Flower. Poultry shows, Exhibitions, Fairs. Clean, attractive, profitable. Sample 25c. De Witt Sisters, Battle Creek, Mich.

AGENTS—If you are earning less than $200 a month, our Sentinel Burglar Alarm proposition for windows and doors will interest you. Many agents earn $15 daily. Both brand new inventions. No competition. Sells on sight to homes, offices. Instantly attached to any door knob or window. No batteries, wires or nails. Handsomely nickel-plated. Provides cheap burglar insurance. Both are big money makers. Write today for liberal terms to agents. Mashall Dobbins & Co., Manufacturers, 1422 Marquette Bldg., Chicago.

INSYDE Tyres, inner armor for Automobile tires, double mileage and prevent punctures and blowouts. Quickly applied. Cost little. Demand tremendous. Profits unlimited. Details free. American Automobile Accessories Co., Dept. P, Cincinnati, O.

AGENTS sell Reliable Custom-Made Raincoats and Gabardines. Big commission. Complete sample line free. Temple Raincoat Company, Templeton, Mass.

AGENTS—Stamping names on Pocket Key Protectors; sample Check with your name and address, 15c. Stamping Outfits, Emblem Checks, Check Fobs, Name Plates. Hart Mfg. Co., Desk 2, 303 Degraw St., Brooklyn, N. Y.

HUGE profits selling Nibco Sanitary Brushes, Auto Washers, Brown Beauty Adjustable Floor Mops, Dustless Dusters, and other specialties. Big line. Fast sellers. Write today. Silver-Chamberlin Company, Department M, Clayton, New Jersey.

AGENTS: Exclusive territory for "World's Best System of Lightning Protection." Big profits and large volume of sales for hustlers. George E. Thompson Lightning Rod Co., Owatonna, Minn.

LARGE Manufacturer wants representatives to sell shirts, underwear, hosiery, dresses, waists, skirts, direct to homes. Write for free samples. Madison Mills, 503 Broadway, New York City.

AMERICAN Military Styles are all the rage in men's tailored to measure suits this season. Easiest to sell; everybody wants them. Far ahead of all others in real class and beauty. Lowest prices,—less than common ready-made suits. Our Agents are coining money. You can earn $10 daily. Send for full particulars, terms and sample book of styles and patterns. American Woolen Mills Co., Dept. 914, Chicago, Ill.

AGENTS Wanted. Get our free sample case offer and start out selling the finest line of soaps, toilet articles and household specialties; goods already in established demand; profits 100% to 140%. We help you build up a big business and are behind you every minute. We guarantee our goods, quality can't be beat. Territories are being grabbed by all the live ones. Write today. Ho-Ro-Co. 109 Locust St., St. Louis, Mo.

YOU can be your own boss with our Key Check outfit. Good for $5 a day stamping names on pocket key checks, fobs, etc. Sample check with your name and address, 15 cents. Pease Die Works, Dept. M., Winchester, N. H.

AGENTS: Big Returns, fast office sellers; particulars and samples free. One Dip Pen Company, 2 Daily Record, Baltimore, Md.

AGENTS Wanted — Economy Kerosene Burners for cooking and heating stoves and furnaces. Big profits. Exclusive territory. Economy Mfg. Co., Dept. D, 616 W. Monroe St., Chicago, Ill.

AGENTS: Big Profits putting up Genuine Gold Leaf Window Letters; Script and 15 other Styles. Chicago Agency Co., 848 Altgeld St., Chicago.

YOU can letter Auomobiles, Windows, Trunks, etc., without previous experience, by Transfer Process. Make $27.50 on $2.50 outfit. Auto Monogram Supply Co., 86 Niagara Building, Newark, N. J.

AGENTS! Quick Sales! Big Profits! Outfit free! Cash or credit. Sales in every home for our beautiful Dress Goods, Silks, Hosiery, Underwear and General Dry Goods. Write us today. National Importing & Mfg. Co., Dept. KD, 425 Broadway, New York.

GET our big money maker monogramming Autos, etc., by transfer method. Catalog and particulars free. Motorists' Accessories Co., Mansfield, Ohio.

AGENTS, $50 a week. Will show you how. Genuine Gold Leaf Window Letters. Chicago Agency Co., 842 Altgeld St., Chicago.

$50 WEEKLY and up selling Mexican Diamonds. Exactly resemble genuine; Same Rainbow Fire; Stand tests; sell at sight; Repeat orders. Write quick for Sample Case offer free. Mexican-Diamond Importing Co., S. W., Las Cruces, New Mexico.

PAYS Better Than Any Job. Manufacturing High-class Big Selling Advertised Specialties in all lines from my Manufacturer's Guaranteed Formulas. No machinery needed. Smallest Investment required. Dessert Powders, Pancake Flour, Tube Flavors, Catsup, Mustard, Eg-Cono-Me the Pure Food Egg Substitute, Laundry Specialties Marvelle Washing Tablets, Family Soap, Blueing. Medical, Toilet, Household and Automobile Specialties. Stamp brings late lists, valuable information for Profitable Independent Business. Miller, Chemist, Tampa, Florida.

SELL "Tire-Cure." Marvelous; Punctures, cuts, blowouts, permanently repaired in 5 minutes without tools or heat. Self-vulcanizing. Experience unnecessary. Saves 500% vulcanizing bills. $1 outfit repairs 75 punctures. Immense profit. Send for outfit and agency. Money-back guarantee to agents and customers. Eastern Rubber Products Co., Baltimore, Maryland.

AGENTS—Demonstrators—District M agers. Best and fastest selling San Brushes, Mops, Dusters and New F Brooms. One man's commission $23.0 day. Four entire sales organizations cently came to us without solicitation other brush concerns, because they our line better. Highest commission. ford Brush Co., 544 W. Lake St., Chi

GASTONE Increases Power, Mil Eliminates Carbon. One hundred ta one dollar. Trial convinces. Good ag wanted. Money Maker. Exclusive terri Write at once. Gastone Company, Ma quette, Nebraska.

AGENTS—Specialty Men, Sell Si Auto Washer Brushes, new auto and w washer—sure, quick cash sales. Free sa ples. Francis W. Mfg. Co., Harris Pa.

SELLS like hot cakes. Big profits. N ironing wax also starch. Perfumes ch lasting violet. Working outfit 5c. Term given. Marshall Manufacturing, 919 Ga Avenue, Brooklyn, N. Y.

"AGENTS—Good profits for spare ti selling Alert High Speed and Ratchet T Wrenches, Roller Grip Manndrels and S Arbors, Hand Knurling Tools and B and Facing Tools."

YOUR name on a Rubber Stamp with address 25c. Central Stamp Wo Newcastle, Ind.

HIGH-GRADE SALESMEN WANTED

$50.00 A WEEK for your spare time. N samples to carry. Sell monogram lea belts from your personal belt. Every m a prospect and our popular price gen bridle leather belt with stylish mo grammed hammered silver buckle sells as rolling off a log. Belt and buckle gu anteed 2 years. Orders filled same day ceived. Belt complete with monogram buckle costs agent $1.00. Sells quickly $1.50 to $2.00. $1.00 invested today this beautiful belt for yourself will b you dividends a thousand fold. Excl territory reserved for those who ac once. The Kloth Belt Co., (Fine Belt Ma ers since 1902.) 406 S. Halsted St., C cago.

SALESMEN—$12.00 to $30.00 per selling our E-Z Advertising Tape and Se ing Machine. Every merchant buys. Lee Novelty Company, 179-P North Mi gan Ave., Chicago.

INVESTIGATE immediately the propo tion now offered by the National Pr Company to responsible and hustling sa men. They manufacture from South Long Leaf Pine the following produ Pinol (Germicide), Pinol (Dandruff Tre ment), Pinal (Insecticide), Pinolac (Br less Auto Varnish), Pinamel (Auto an niture Polish), Pinolin (Leather Dres also widely advertised Red Snapper P Food. Exclusive territory and liberal missions. Call on druggists, barber sh furniture stores, hardware stores, gar and florists. For full information ad National Products Company, Gen. Sales fice, Eau Claire, Wis.

ANTI-BLEEDING Cotton, stops ble District Manager wanted. Galvo Mar turing, 1386 East Fortieth, Cleveland.

SALESMEN Wanted to sell Electric Lighters and Moisteners. Salary or mission. You carry stock or we ship Write for special offer. Drake Mfg. 221 Grand, Milwaukee, Wisc.

SALESMEN: — Calling on blacks trade, investigate our new tool for a line. Western Boiler Pipe Company, M mouth, Illinois.

SALESMEN—To place small orders $6.65 in country stores as a side line; mission $1.15. Dr. B. J. Cline, P Bluff, Mo.

SALESMAN: Energetic Man to H Our Line of Advertising and Comm Pencils, Good Commissions, Advances on Sales. Address: Peerless Pencil Louisville, Ky.

YOUNG men everywhere as Salesmen District Managers. $25-$50 weekly. New Brush Co., Hartford, Conn.

SALESMEN—City or Traveling. Exp ence unnecessary. Send for list of o ings and full particulars. Prepare in s time to earn the big salaries—$2,5 $10,000 a year. Employment service dered members. National Salesmen's T Ass'n, Dept. 125-G, Chicago, Ill.

MEN who can finance $500 sales f in each district to represent Tubo, d from factory, guaranteed to preserve r and close punctures. Big profits. T Vandeventer Ave., St. Louis, Mo.

SALESMAN of ability wanted for exclusive territory to sell a Perfect Belt Lubricant, direct to manufacturers. Our commission guarantees a sure income. American Lubricant Works, St. Louis, Mo.

WANTED—Salesman calling on Hardware, Dry Goods and Department Stores, to handle as side line the Playette Baby Swings; large sellers; big commissions. Address for further information, The Valley Supply Co., Manufacturers, St. Louis, Mo.

NEW Advertising Side Line Specialty; will earn you $5 to $10 daily; quick seller; sure repeater. Small pocket outfit. G. Furlong, 711 S. Dearborn, Chicago.

SALESMAN Wanted — Splendid opportunity to earn $3,000 to $5,000 per year representing large Correspondence School; this is a bona fide proposition. Previous experience valuable; first-class references required regarding character and ability; exclusive territory open to right man or woman. E. S. Smith, Federal School of Commercial Designing, Minneapolis, Minn.

FOR Salesmen calling department stores have excellent side line. Box 201, Hartford, Conn.

SALESMEN—Side-line sewing machine oil; practically every store buys it; good commission; free sample; weighs three ounces. The King Company, Rockford, Illinois.

TRAVELING Salesman desires to represent manufacturer on coast. Write me today. Rooker, 361 Third Avenue, San Francisco.

$10 TO $100 a week. Free Samples. Gold Sign Letters anyone can put on windows. Big demand. Liberal offer to general agents. Metallic Letter Co., 431E N. Clark St., Chicago.

SALESMEN to Sell Grocers—The Store-Helps Pricing Systems; thoroughly modern and a good seller. They are absolutely necessary in a retail grocery store and you can sell every grocer and make $2.55 on each No. 1 Outfit. We pay commissions promptly. Pocket samples. Store-Helps Mfg. Co., Federal Life Bldg., Chicago.

TWO Hundred Dollar Guaranteed Phonograph Outfit sent on approval for $74.50. Seventeen dollars' worth records, and two dollars' worth needles free. Fifty dollars a week taking orders from this sample. Write for particulars. Play All Phonograph Makers, 316 So. Wabash Avenue, Chicago.

FURNACE Oil Burners, Ford Nonkicks, Seneca Filters. E. L. Miller Mfg. Co., Kansas City, Mo.

SALESMEN, Energetic, to visit schools; $100 salary and liberal commission. R. O. Evans & Co., 1100 L. Wabash Ave., Chicago.

SALESMEN Wanted to sell the most practical oiler ever made for the springs of automobiles and trucks. Small sample. Big profits. Write today. Van Spring Oiler Co., 222 N. Wabash Ave., Chicago.

SIDE Line Salesmen. Six samples hand made mailing envelopes. Sell to banks, financial institutions, city and county officials, abstractors and mortgage houses. Big commissions daily and big repeats. C. E. Hunt & Co., Est. 1911, 17 E. 22nd, Chicago.

REPRESENTATIVE Wanted — We want an aggressive man to devote whole or part time on substantial, dignified, high-class proposition. Every steam plant a prospect. Every order means a repeat. Address Dept. H. 1750 Monadnock Blk., Chicago.

SIDE Line—Something new, 400% profit. Every Business, Professioanl Man must use it up continuously. Retails $5.00, your profit $4.00. Quick sales. Instant re-orders. Secretary, Drawer 596, Hartford, Conn.

CALIFORNIA Rosebeads selling like hot cakes. Agents coining money. Absolutely new. Big profits. Catalog free. Mission Bead Company, SP2819 West Pico, Los Angeles.

FASTEST Selling Advertising Specialty Made. Your customers—why not sell them. Best side line yet. Look us up, then write C. E. Erickson & Co., 202 Erickson Bldg., Des Moines, Iowa.

WERE You Ever Offered a Grocery Store? Our Proposition is Better. Let us tell you how you can handle Flour, Canned Goods, Provisions, an entire line of groceries, as well as Paints, Roofing, Stock Food, Automobile and Machinery Oils and Greases. No rent to pay. No investment in stock. Large orders taken from samples. Goods of guaranteed and proven quality. Selling experience not necessary. Very profitable work for "workers." Address Hitchcock Hill Co., Dept. 200, Chicago, Ill. Reference: Any Bank or express company.

80 PER CENT commission to exclusive state sales managers, representing us in one of the states which are still open east of the Rocky Mountains, with the exception of Ohio, Indiana and Kentucky. You must carry supplies, nothing less than $350, wholesale price, for immediate delivery through your salesmen to your customers. This is a big proposition and an unlimited field if you get on the ground floor; will stand strictest investigation and a business second to none. General Sales Manager, U. C. Association, 1028-31 Black Bldg., Los Angeles, Cal.

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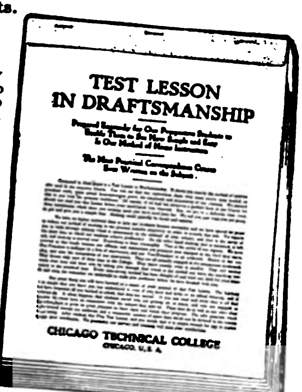

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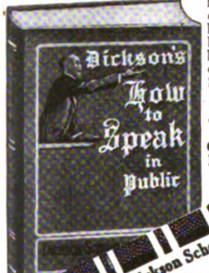
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State of Illinois, County of Cook, ss.

Before me, a notary public in and for the state and county aforesaid, personally appeared H. H. Windsor, who having been duly sworn according to law, deposes, and says that he is the editor and business manager of the Popular Mechanics Magazine and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form, to wit: 1. That the names and addresses of the publisher, editor, managing editor, and business manager are: Publisher, Popular Mechanics Co., 6 No. Michigan Ave., Chicago, Ill. Editor, H. H. Windsor, 6 No. Michigan Ave., Chicago, Ill. Managing Editor, J. L. Peabody, 6 No. Michigan Ave., Chicago, Ill. Business Manager, H. H. Windsor, 6 No. Michigan Ave., Chicago, Ill. 2. That the owners are (Give names and addresses of individual owners, or, if a corporation give its name and the names and addresses of stockholders owning or holding 1 per cent or more of the total amount of stock): H. H. Windsor, 6 No. Michigan Ave., Chicago, Ill. 3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages or other securities are (If there are none so state): None. 4. That the two paragraphs next above, giving the names of the owners, stockholders and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company, but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

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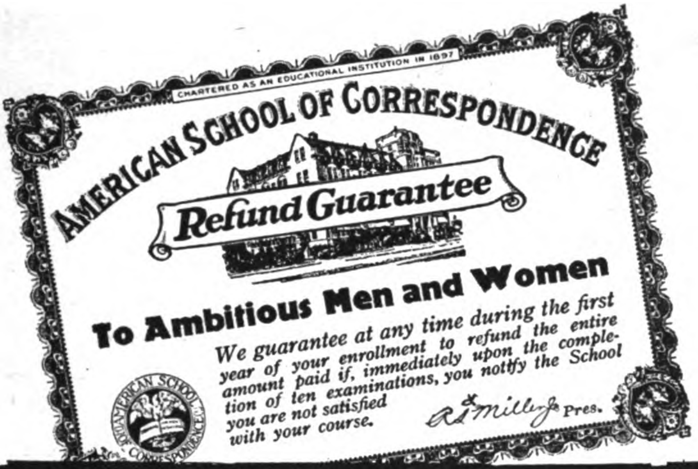

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Don't Fool Yourself

Every day you put off training you have to pay the price of *not knowing how*. The amount you earn represents what you know—what you can DO. The problem of how to increase your earning power is simple—just TRAIN. Don't be fooled into thinking that "luck" or "pull" will make you a winner. The man without training just scrambles through life —never a money-maker—never sure of his job—never holding a responsible position. It's the trained man who gets all the favors—the best jobs and the big pay. As long as you refuse to train you must pass up opportunities and make way for the man who does. Face the facts and then let the American School help you into a better position—the one you want—as it has helped its thousands of students. Get into the game. Don't sit on the sidelines.

You Take No Risk

We guarantee our service to you—absolute satisfaction or your money back—so why delay promotion and better pay? Every day you put off training it costs you money—money that you might be getting but DON'T because you *don't know how*.

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...Master Plumber
...Civil Engineer
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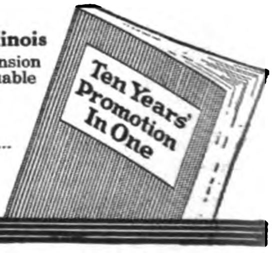
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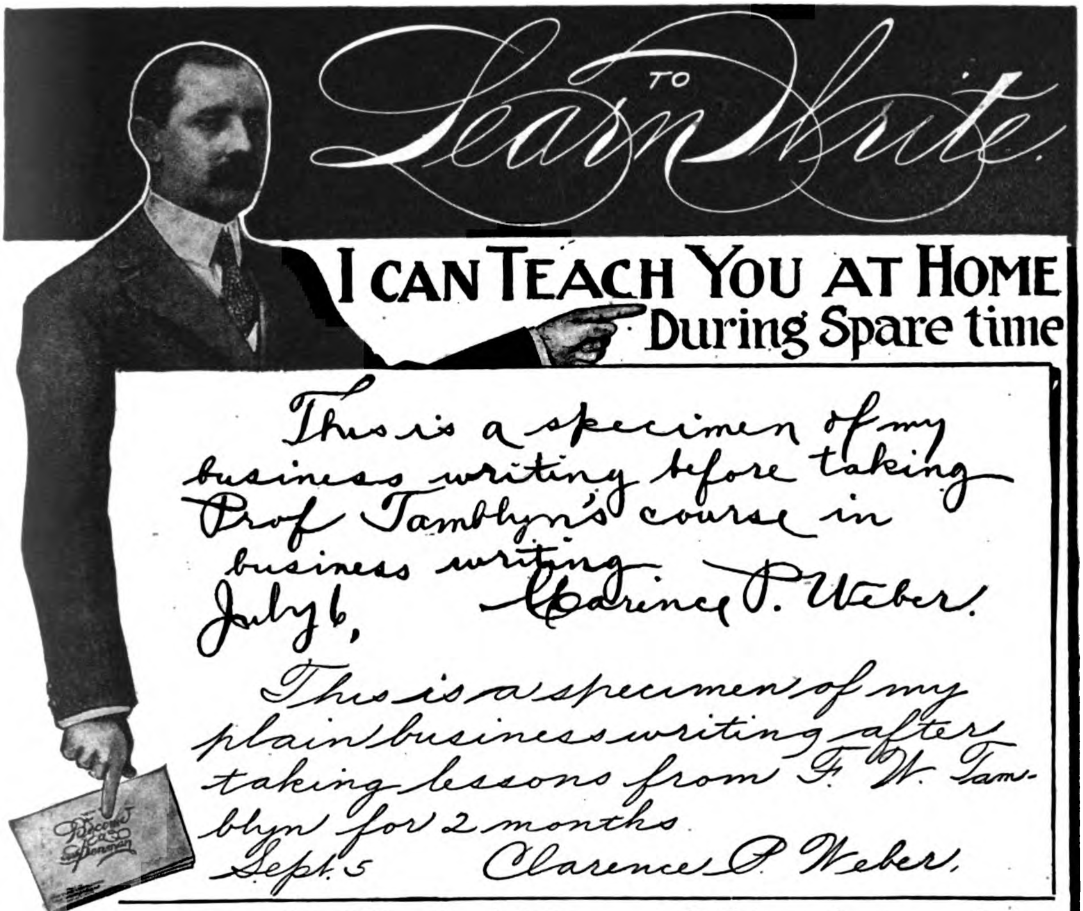
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☐ Telegraph Engineer
☐ Telephone Work
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☐ Machine Shop Practice
☐ Gas Engine Operating
☐ CIVIL ENGINEER
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☐ ARCHITECT
☐ Contractor and Builder
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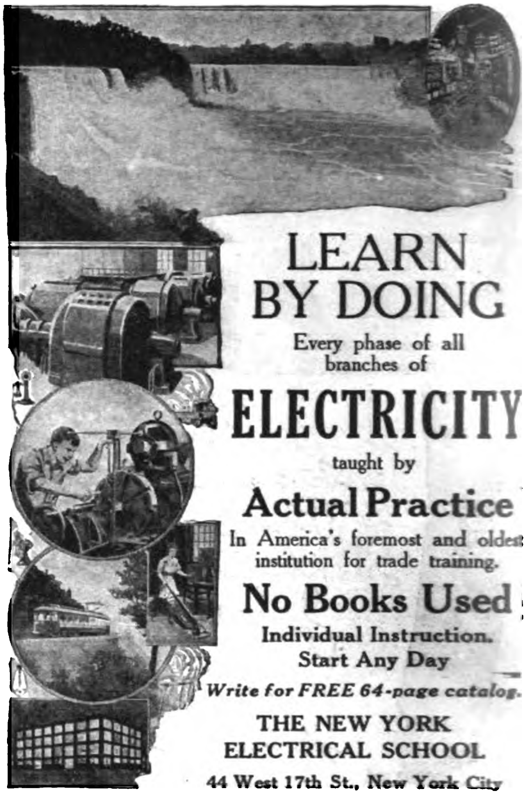

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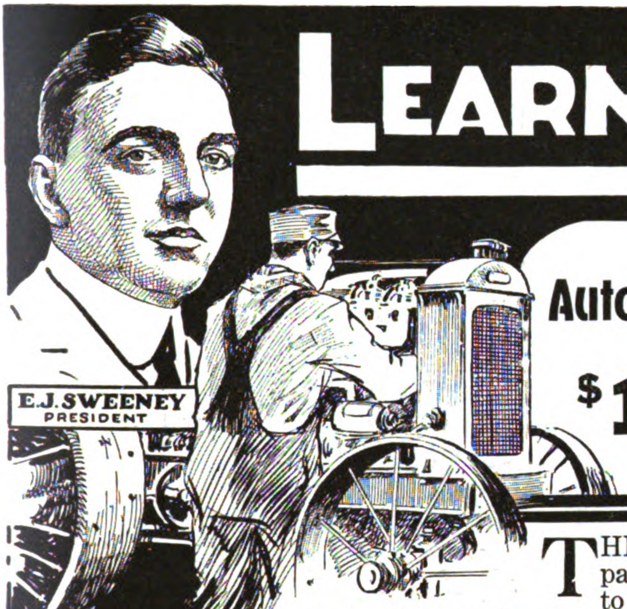

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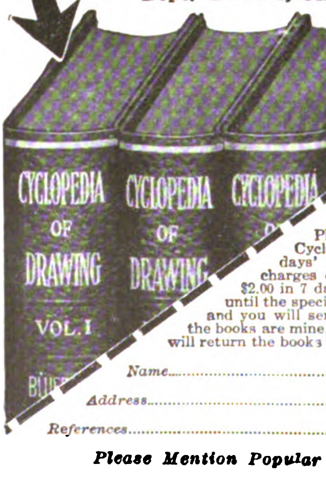

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☐ Metallurgist or Prospector
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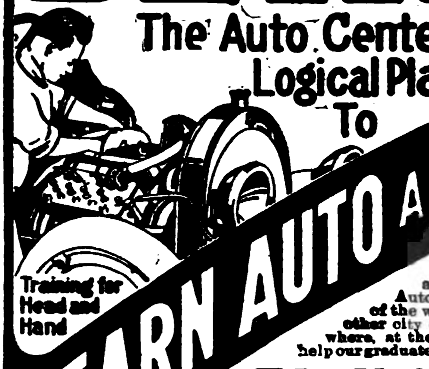
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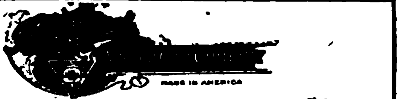
Wish to say that this is one of the best schools in the country, and would not hesitate to recommend it to anyone who is desirous of learning the automobile business. It is a recognized institution among the automobile factories of this city.

We have a great many graduates from this school in our employ and every one has given entire satisfaction.

Trusting this information will be of benefit to you, we remain,

Very truly yours,
MAXWELL MOTOR COMPANY, Inc.
CHALMERS PLANT.
H. H. LEE Supervisor Welfare and Labor.



Detroit, Mich. U.S.A.

The Michigan State Auto School enjoys a very enviable reputation and is probably one of the best of its kind in the United States. I have no hesitation in recommending it in every particular. Yours very truly,
PACKARD MOTOR CAR COMPANY.

KING MOTOR CAR COMPANY

BUILDERS OF
KING CARS
ARTEMAS WARD JR.
PRESIDENT

DETROIT, U.S.A.

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Yours very truly,
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Your practice of co-operating with the factories is very commendable, for it brings together the biggest men and most successful ideas to be had.

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Hundreds of our graduates are in business for themselves, repairing cars and are making from $2,500 to $10,000 and more a year. They went into a business on a small capital and succeeded because they knew the business thoroughly. There are thousands of opportunities open today right in your own town. You, too, can succeed if you let us train you. You can do more jobs if you know just how to locate the trouble quickly.

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Deal in new and used machines. Everyone has been making big money for three or four years. Farmers have obtained big prices. Everyone wants an auto, needs a truck or tractor and has the money to pay for it. You should know the business thoroughly before you enter the selling end of it. The used machine field is unlimited and you lose money if you do not know how to judge used machines. Then too you can give service properly if you know how.

Get Job in Factory, Garage or Service Station

Factories are constantly asking for men at big wages. They want trained men, and are eager to have our graduates. Garages write us for our men. Factories need men all over the world in service stations and as travelling service men. These men must be able to locate trouble at once and our men are in constant demand. Then too our graduates who have gone into business for themselves ask us for graduates, for they know we train them right. We assist in getting graduates just what they want.

FACTORIES ENDORSE OUR SCHOOL

The leading automobile factories in Detroit and other cities endorse our school, our equipment and our methods of teaching. They endorse the good work we are doing, in fact they assisted us in outlining our course and they have included lectures on practical theory in the courses, knowing that you cannot learn the business properly without them. You must train the head to guide the hand. Read some of their endorsements on this page. These were written in reply to letters from different parts of the country asking about us. We enjoy their keenest co-operation and you, as a student (here in Detroit, the auto center), get the benefit of it. This school is highly endorsed, and has a world-wide reputation for excellence.

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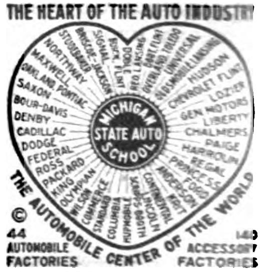

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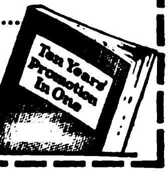
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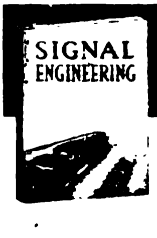

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By Prof. Henry Dickson

PROF.
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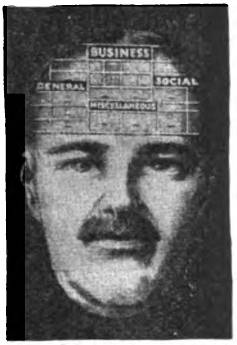

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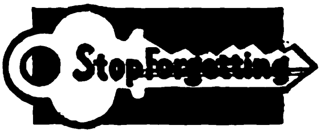

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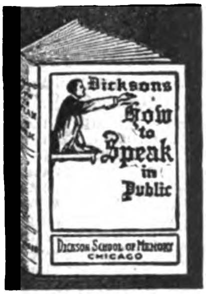

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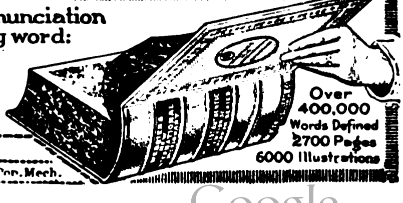

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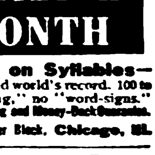

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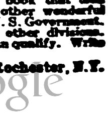

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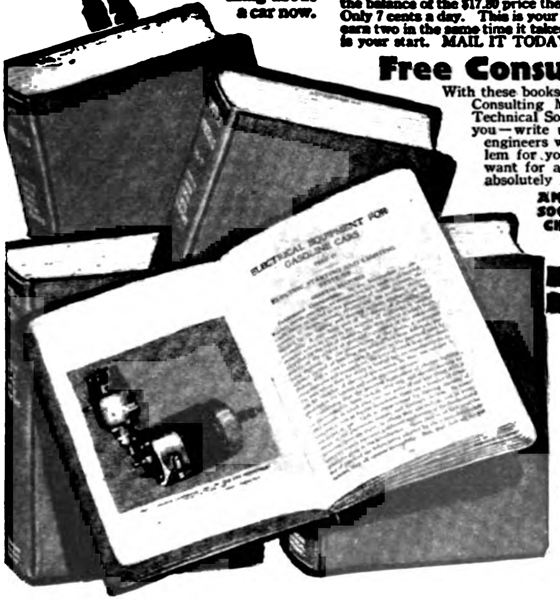

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Entire course of instruction given by practical, experienced, successful traffic men. Their counsel and advice come from their daily experience. They know the needs and requirements and they know the methods and information necessary to meet them, hence are amply fitted to successfully teach others. Each student gets personal attention. Practical assistance rendered for two years after graduation. An ordinary education, ambition and determination are all you need to win. An established Traffic Department at School furnishes practical experience, also offers opportunity for

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Mere wishing and hoping will not bring results. You must get action if you would climb. The difference between "wages" and "salary" is in being able to do something the crowd can't do. Success is a matter of preparation — it doesn't "just happen." The man willing to pay the price of preparation gets the big salary. Get out of the rut! Don't drift. Be a winner, not a wisher—and loser. Give yourself a chance. Only one thing can stop you—that's You. A pleasant job at a big salary awaits you as a trained Traffic Man. Our free booklet "Traffic" gives full particulars — tells How you can "learn to earn the big salaries." The first step is to start — Now! Prove your ambition. Take a step for Success. Write Today!

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TRAFFIC MANAGERS' salaries range from $3,000 to $25,000 yearly.

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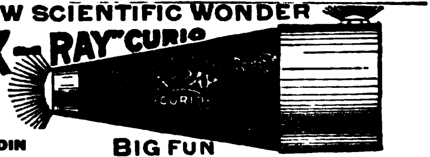

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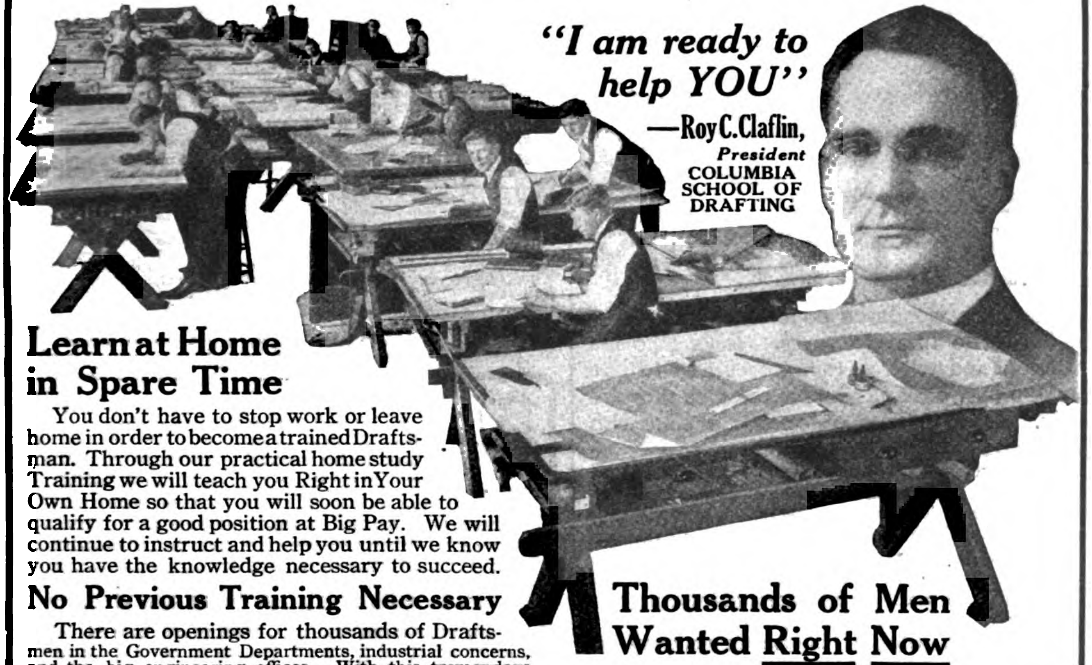

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with big chances for even better pay as the demand grows. By enrolling **NOW** for our practical Home Study Course in Drafting you can quickly qualify for a position as Draftsman and by properly applying the principles we teach

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and get to the very top in this fascinating profession. Our course will give you just the knowledge you need to make good as Chief Draftsman when your chance comes.

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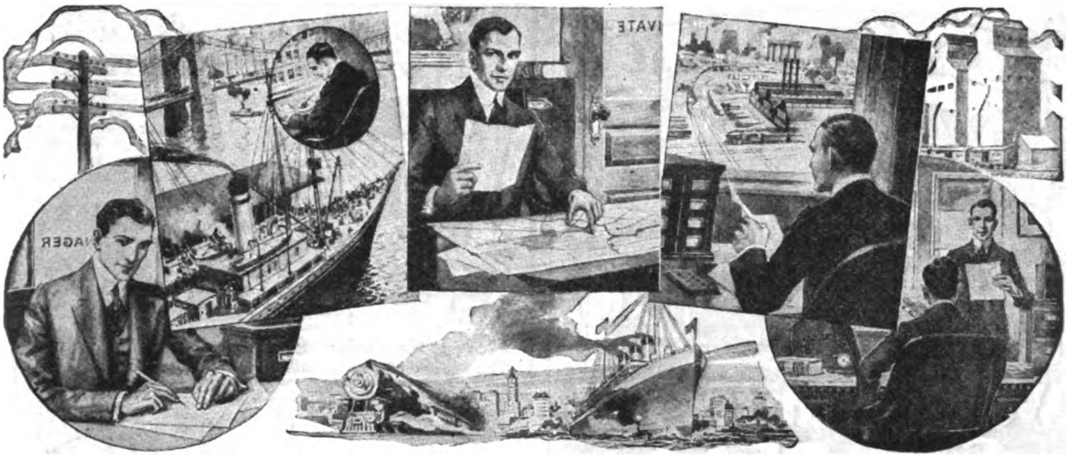

A Bigger Job Yours—If You Master Traffic Management

Reconstruction work to be done in Europe and expansion of our foreign trade means a greater demand than ever before for men trained as traffic experts. Great plants working overtime—raw materials shipped in—finished products shipped out—carloads, trainloads, shiploads, going North, East, South, West—contracts placed not on price basis, but for quick delivery—that is the condition we are facing.

"We must have efficient traffic men" say manufacturers, jobbers, railroads, ship owners. Hundreds are needed where one is available. This is the chance for ambitious men to rise to higher positions—to get into an uncrowded calling—to have the specialized knowledge which commands big salaries.

Train by Mail Under LaSalle Experts

This opportunity is yours now. Train while you hold your present job. Only your spare time required to become proficient in every branch of traffic.

Learn from men who have held or are among those now holding the highest positions in the field. Get practical training—the training which equips you to step into one of the highest places. This is what the LaSalle experts offer you.

They will explain every point concerning Freight Rates Classifications, Tariffs, Bills of Lading, Routing, Claims, Demurrage, Express Rates, Ocean Traffic, R. R. Organization, Regulation and Management, Laws of Carriers, Interstate Commerce Rulings, etc. etc.

How many men are expert on even one of these subjects? You will be made proficient in all.

And here is something more—your enrollment gives you free the privileges of our Business Consulting Service. This means advice from our staff whenever you need help on any special business problem.

Over 800 people here—300 business experts among them—are ready to put you on the road that leads directly to advancement. Get the complete, combined experience of many authorities, all given in easily understood form.

No Large Fees

The total cost is small. Your increase in earnings will soon pay it (see in next column what McMullen, Wright and other members say). Then also you can pay on easy terms—a little each month if you wish. No hardship in getting this training. Any man can afford it. And the time is now—when the great movement in business is beginning. Give a few hours weekly of your spare time for a few months—and get a larger salary.

Send the Coupon and Get All the Facts

Your request will bring complete information. We will tell you just what the course offers in every detail; all about the opportunities open to trained traffic men. We will also send you our book, "Ten Years Promotion in One" which has shown thousands of men the short road to promotion. If you are ambitious to rise—if you want to enter a paying and uncrowded field of business, get these facts. Sending the coupon implies no obligation upon you. Mail it today.

B. S. McMullen was a freight checker on the docks at Seattle.

Two years after beginning the LaSalle Course in Interstate Commerce and Traffic Management he was appointed General Freight and Passenger Agent.

He said that it would probably have taken him 8 or 10 years to make this advance if he had depended merely upon work and experience.

LaSalle experts helped him to reach the top in the space of months.

T. J. Wright, an Illinois member, reports three promotions since taking the course.

H. S. Watson, of Michigan, figures his increased earning capacity at 400 per cent.

Fred Hoffman, an Ohio member, reports 600 per cent profit on his investment in one year.

Among the many LaSalle trained men who are now Traffic Managers or Experts on Interstate Commerce are:

Wm. Ritchie, Vice-President and Traffic Manager, Philadelphia Lawn Mower Co.

F. E. Combs, Traffic Director, Twin City Traffic League, Benton Harbor, Michigan.

F. E. Hamilton, Traffic Manager, Retail Merchants Association of Canada.

Mr. Hamilton says: "I cannot speak too highly of this institution. The course is up-to-date, authentic, and easily understood. My only regret is that I did not take it up five years ago."

The success these men have made can be paralleled by any other ambitious man who will do as they did—train!

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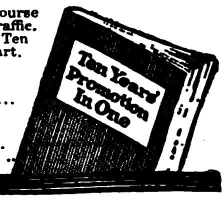
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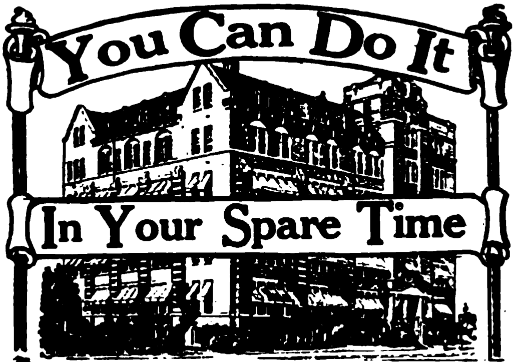
You Can Do It



In Your Spare Time

We Guarantee You SUCCESS

SUCCESS means bettering your position, pay and prospects. Getting on, getting promotion, means knowing a little more than the other fellow. Being able to think and act for yourself—having a grip on your task—that's the stuff that doubles and trebles your pay. You can do this—do it without a doubt—and we'll guarantee it. No matter what line you follow, we can give you the right grip on your job—the grip that boosts your earning power. We've put thousands in better positions, and we can put YOU.

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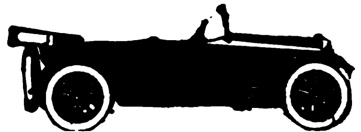

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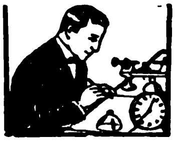

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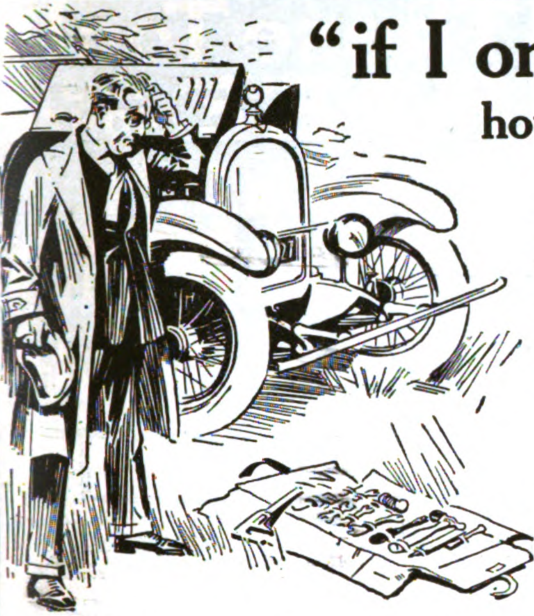

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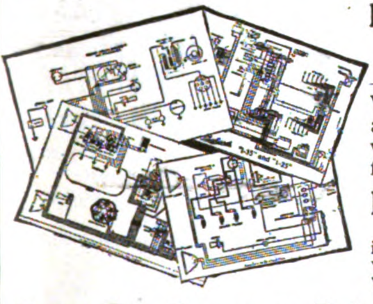

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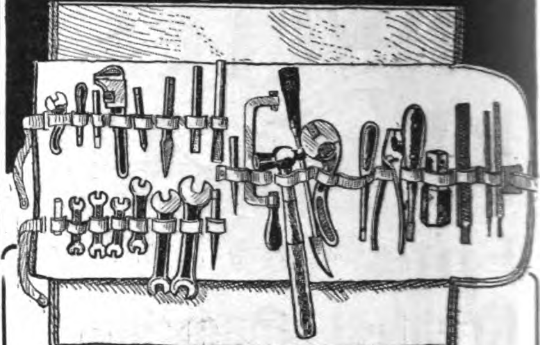

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Saving money out of the meagre wages he got in those days was almost impossible. He had practically nothing laid aside. But it was enough to give him his start; enough to set him up in business for himself—a new kind of business that has proved a regular little "gold mine."

That was only a few years ago. Today Fred is making around $6,000 a year—and his profits are steadily increasing. While he doesn't work half as hard as he used to, he is pocketing more every day than he formerly earned in a week. Is his own boss—doesn't have to take orders from anyone. Has bought a fine home—all paid for. Rides around in a $2,000 car. Has a substantial and growing bank account. Enjoys many other comforts and luxuries that a few years ago he scarcely even dreamed of.

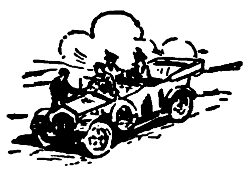
How did he do it? No previous business experience—had been a plain workman. Had only a common school education. And he himself would be the last man in the world to credit his quick rise to prosperity to any special genius or ability on his part.

Some may say he was lucky. But it wasn't luck. Proof of that is the fact that hundreds of others, both before and since, have put themselves on Easy Street in exactly the same way he did.

Here is the whole secret. It was a money-coining machine that piled up Fred Cline's profits, that built his house, that paid for his car and other comforts; a patented machine that almost automatically builds up a fine business by making the finest 5c confection that anyone ever ate—a wholesome, delicious and entirely different new kind of pop-corn candy that people grow wild over wherever it is introduced. It is called Crispettes—so tempting to look at, so appetizing in its delightful odor, so bewitching to the taste—that it literally turns into money as fast as it can be made.

Now Owns a Fine Home

Fred Cline deserves full credit for his success. He was quick to see his opportunity and quick to seize it. But when you know the facts, it is easy to see why Fred has prospered. Regardless of age practically everybody has a sweet tooth — men, women, children. Crispettes appeal to this universal sweet tooth in a way that is simply irresistible. You can't see them or smell them or taste them without feeling "hungry" for them. Unlike chocolates and other "heavy" candies, they don't tax the digestion. You can't eat enough Crispettes to hurt you. People never get tired of them. That means steady, come-again customers.



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They are only 5c a package — an amount that is easy to spend; where there is one person who can afford high-priced candies, there are hundreds who will buy at 5c. Nickel sales to the many will always beat dollar sales to the few. On a good day Crispettes sell about as fast as you can hand out the packages and take in the money. They almost sell themselves. The mere sight or smell of them makes the mouth water—and makes a person reach for a nickel.

The Crispette Machine can turn out as high as 800 5c packages an hour—$40 every hour. Nearly 4c out of every nickel you take in is clear profit — about 76c out of every dollar. The ingredients are nothing but pop-corn and syrup—but cooked and blended together by a special formula that brings out an enchanting new flavor that people say is the most delicious they ever tasted.

Cash in on Prohibition

Think of the millions of dollars heretofore spent for liquor! After July 1st it will go for other things. The Crispette business will be the first to profit. Towns previously dry show that men who can't get liquor turn to Crispettes by thousands — they crave sweets — and Crispettes make a hit because they can be eaten all day long without hurting anyone. Prohibition also gives children more nickels to spend. Investigate now — don't wait until someone else seizes this opportunity.

There is only one way to make Crispettes — that is on the patented Crispette Machine. The process is almost automatic. Special secret formula included with the machine. Also full instructions for building up a profitable business right from the first day, either retail or wholesale or both — the tried and proven ideas used by scores of others already in the business. I show you how to draw crowds—how to cash in on fairs, picnics, holidays, etc. — every step made easy so you can't go wrong. No experience necessary. The Crispette Machine, the Crispette formula and the instructions are all you need. Small sum buys the complete outfit. Don't even have to open a store. Can do business from your home or rent part of a store window. The Machine in a window is a great salesman—attracts attention—brings in customers. And there are many other advantages.

No wonder (*) Fred Cline is making money. But he isn't the only one. Crispette Machines and the delicious candy they make are piling up fine profits for hundreds of others. Listen: An inexperienced boy "cashed in" $1435 the first five weeks. A former clerk in a railroad office got his start in the Crispette business and is now wealthy. Another man made $400 net in one week. A former printer sold $22,000 worth of Crispettes the first seven months—figure his profits for yourself. Another man made over $500 in a single day. Another $700 ahead in less than two weeks. And so it goes.

This is a big country. There are still thousands of towns and cities waiting for some live man to start up in the Crispette business. Big money-maker by itself or can be handled in connection with other business. Every town of 1,000 people or more means an opportunity. May be here is exactly the chance you yourself have been wishing for. Why not at least look into it? Just send me your name on the coupon below and I'll send you all the facts and figures so you can judge for yourself — including the names and addresses of all the men mentioned here, with letters from them and others backing up everything I say. But send the coupon now—before you have a chance to forget — and before someone else in your town beats you to it. A postage stamp is all it costs to get the facts—that is all you have to risk to find out about a money-making opportunity that may mean prosperity for the rest of your life.

(*) This man is modest. Fred Cline is not his real name—he prefers not to have his identity published broadcast in a magazine. His real name and address, however, will be given on request.

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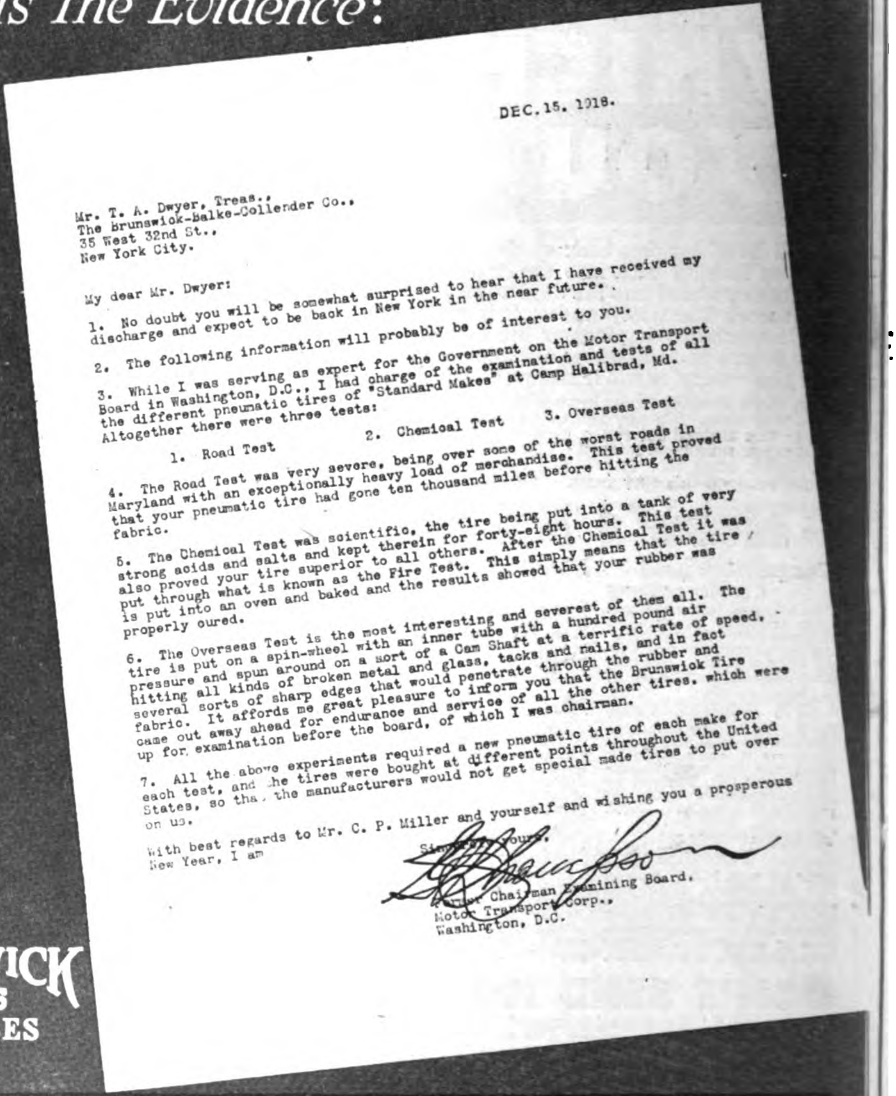

DEC. 15. 1918.

Mr. T. A. Dwyer, Treas.,
The Brunswick-Balke-Collender Co.,
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My dear Mr. Dwyer:

1. No doubt you will be somewhat surprised to hear that I have received my discharge and expect to be back in New York in the near future.

2. The following information will probably be of interest to you.

3. While I was serving as expert for the Government on the Motor Transport Board in Washington, D.C., I had charge of the examination and tests of all the different pneumatic tires of "Standard Makes" at Camp Halibrad, Md. Altogether there were three tests:

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5. The Chemical Test was scientific, the tire being put into a tank of very strong acids and salts and kept therein for forty-eight hours. This test also proved your tire superior to all others. After the Chemical Test it was put through what is known as the Fire Test. This simply means that the tire is put into an oven and baked and the results showed that your rubber was properly cured.

6. The Overseas Test is the most interesting and severest of them all. The tire is put on a spin-wheel with an inner tube with a hundred pound air pressure and spun around on a sort of a Cam Shaft at a terrific rate of speed, hitting all kinds of broken metal and glass, tacks and nails, and in fact several sorts of sharp edges that would penetrate through the rubber and fabric. It affords me great pleasure to inform you that the Brunswick Tire came out away ahead for endurance and service of all the other tires, which were up for examination before the board, of which I was chairman.

7. All the above experiments required a new pneumatic tire of each make for each test, and the tires were bought at different points throughout the United States, so that the manufacturers would not get special made tires to put over on us.

With best regards to Mr. C. P. Miller and yourself and wishing you a prosperous New Year, I am

Sincerely yours,

Former Chairman Examining Board,
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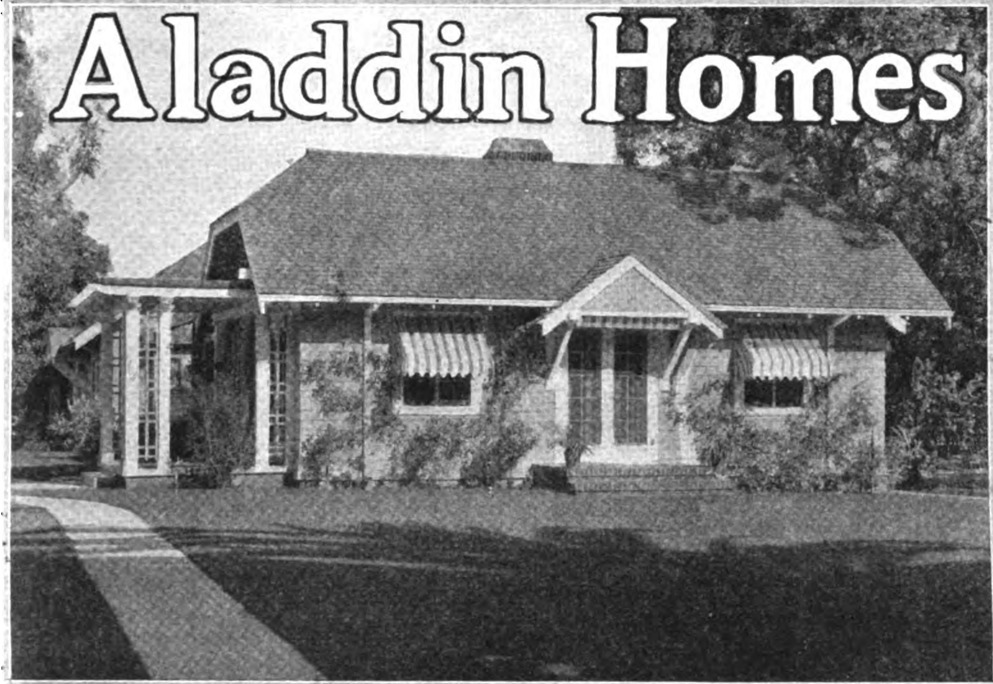


Build Your Home This Year!

That charming bungalow Home — bordered in flowers — bathed in sun-light — the one you have dreamed of — can now be yours. It may be a snug and cozy cottage, complete with five rooms on one floor, or a more pretentious bungalow of charming proportions. These types and many others are found in the Aladdin Book — complete home-building library of 100 designs — 100 ideal homes. Besides this, there is a vital message for you in this most remarkable book, that will be sent at your request.

$18 Out of $100 Saved

Of course, you would like to save money building your new home—would like to build at the lowest possible price. But you cannot expect to save very much money by bargaining or getting different prices. You can only expect to save money by saving labor in building your home and eliminating waste of lumber. Aladdin Readi-Cut Houses are cut-to-fit in Aladdin Mills by Rapid Power Machines. Old-fashioned building waste is reduced from 18% to less than 2%—a saving of practically $18 on every $100 worth of lumber. And you save a third of the labor in builidng your home. This saving of lumber and labor will mean a large percentage of the cost of the entire building. The Aladdin Book shows you how it is done. **Send for this book today.**

Send for Beautiful Book of Homes

Aladdin houses are cut-to-fit—no waste of lumber or labor. The Aladdin price includes all materials cut-to-fit as follows: Lumber, millwork, flooring, outside and inside finish, doors, windows, shingles, lath and plaster, hardware, locks, nails paint, varnishes.

ALADDIN READI-CUT HOUSES Sold By The GOLDEN RULE

Send today for copy of "Aladdin Homes" No. 180

THE ALADDIN CO., 965 Aladdin Ave.,
BAY CITY, MICH.

Canadian Address: Canadian Aladdin Co., Ltd., C. P. R. Bldg., Toronto, Ont

Stick

Cream

Powder

Liquid

Makes Hard-water Shaving Easy

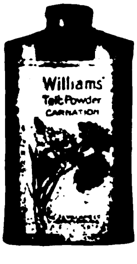
Half of the men of the United States have to shave with "hard" water. And the Williams' chemists took careful note of that fact when they created their shaving soap.

Even the "hardest" water can't make Williams' lather sticky or stringy. Wherever you travel, whatever water you get, the Williams' lather is always abundant, creamy, velvety, and will not dry on your face. Globe-trotters, traveling salesmen, sailors and soldiers, know this. They know, too, that the patented holder-top adds great convenience in using the stick—a convenience which grows greater the longer you use it. Get a stick tonight and defy the hardest water and the hardest conditions.

Send 20c. in stamps for trial sizes of the four forms shown here. Then decide which you prefer. Or send 6c. in stamps for any one.

The J. B. WILLIAMS CO.
***Dept. A*, Glastonbury, Conn.**

After the shave or the bath, you will enjoy the comforting touch of Williams' Talc Powder. Send 4c. for a trial size of the perfume you prefer—Violet, Carnation, English Lilac or Rose.



Williams'

PATENTED Holder Top Shaving Stick

THE J.B WILLIAMS COMPANY, GLASTONBURY, CONN.

Push! And the Spring Pushes It Back

The long, live spring in the "YANKEE" Quick Return Spiral Ratchet Screw-driver relieves you of much of the work of driving and drawing screws. Saves about half your time too.

Just PUSH on the handle—and the spring pushes it back, ready for you to push again. You need not pull nor twist. Just PUSH! The spring holds the blade snugly in the screw-slot.

To draw the screw, just move the Ratchet Shifter and—Push! The Spiral Ratchet works just as well in reverse.

And speed? Fast as you can move your hand. You can't outspeed the Return Spring.

Best of all, you can work one-handed; 'way up over your head and in awkward places where you can't use both hands.

Right- and left-hand Ratchet and rigid adjustment, at the touch of your finger to the shifter.

And don't think that "YANKEE" Tools are delicate or fragile because they are not heavy and awkward. Every "YANKEE" Tool will not only do the work for which it is intended, but has rugged strength that will withstand actual abuse.

"YANKEE"

Quick Return
Spiral Ratchet Screw-Driver

With three sizes of bits.

No. 130—Standard Size (illustrated)	Price **$2.70**
No. 131—Heavy Pattern	Price **$3.50**
No. 135—Light Pattern	Price **$2.15**

Your Dealer Can Supply You

The "YANKEE" Quick Return Spiral Ratchet Screw-driver makes a practical and powerful Push Drill, too. You can obtain the following "YANKEE" attachments: Chuck and Eight Drill-points; Screw-holder; Screw-eye holder; Countersink.

Write for this free "YANKEE" Tool Book showing "YANKEE" Tools in action; better ways of drilling, boring, tapping, and driving and drawing screws.

NORTH BROS. MFG. CO.
PHILADELPHIA

"YANKEE" TOOLS
Make Better Mechanics

WALTHAM THE SCIENTIFICALLY BUILT WATCH

AND THE FOREIGN BUILT WATCH

Know Something About the "Works" in the Watch You Buy

IF you open your watch and examine its mechanism, you will find it consists substantially of two supporting plates, between which is mounted a gearing of meshed wheels to take care of the movement, recording time. This is called the train, which we will speak of in our next advertisement.

The lower supporting plate in a Waltham watch is the foundation upon which every unit revolves and is fixed. It is bored with minute holes to take the pivots, screws, pinions, etc.

This lower plate is drilled and threaded by one of the most exclusive and wonderful machines ever designed by the genius of man — an exclusive Waltham invention from the master-mind of Duane H. Church.

Many operations are accomplished with such methodical, automatic regularity that one instinctively imagines that a marvelous human brain guides the extraordinary operations of this machine.

It makes every operation (and there are 141) with infinitesimal exactness to the ten thousandth part of an inch — flawless, beautiful in its complex simplicity — every plate a replica of every other plate, proving Waltham standardization to be one of the miracles of American mechanical genius.

The plate of the foreign built watch is subject to the variations of hand process. Made to variant sizes and models without precise relation to the parts which they are to contain, which parts are made elsewhere in many homes and small shops, by hand.

No hand work could ever approximate the beautiful and flawless exactitude of this Waltham drilling and threading.

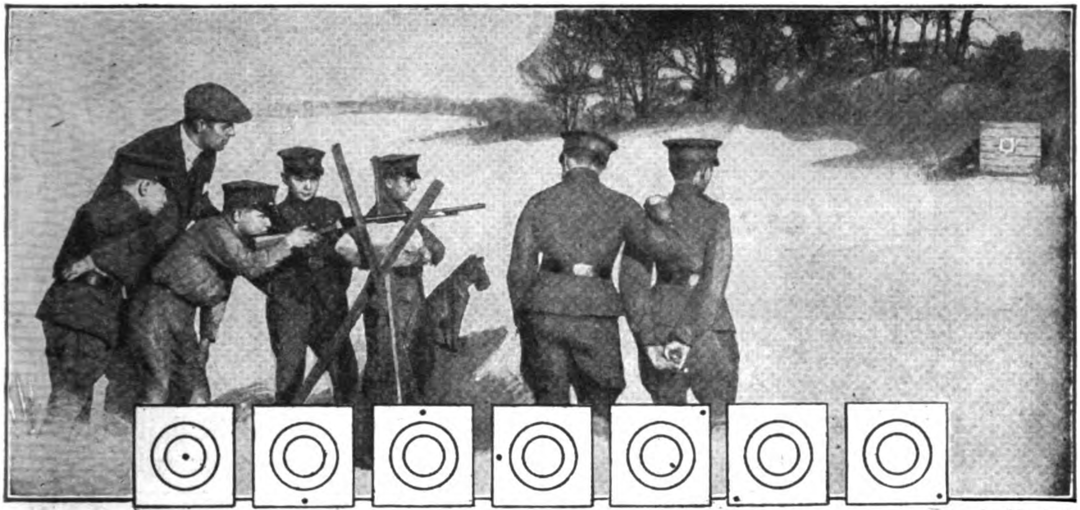
So when you buy a Waltham watch you are assured of a standardization of quality and leadership which has placed the Waltham watch on the pedestal of world dominion.

Pendant and Bow Patented

Waltham Colonial A
Extremely thin at no sacrifice of accuracy
Maximus movement 21 jewels
Riverside movement 19 jewels
$135 to $255 or more
depending upon the case

WALTHAM

THE WORLD'S WATCH OVER TIME



In this simple sighting stand, the rifle is pillowed on a bag of loose earth. When the boy thinks he has lined up the sights on the target, the rifle will hold its position while the instructor sights along the barrel to see if the aim is correct.

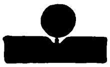


Fig. 1
Full open sight.
Correct aim.

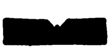


Fig. 2
Fine sight. Low shot

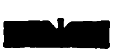


Fig. 3
Too full. High shot

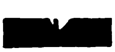


Fig. 4
Not centered. Left shot

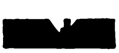


Fig. 5
Not centered; too full. High right shot

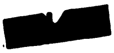


Fig. 6
Sight inclined. Low left shot

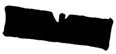


Fig. 7
Sight inclined. Low right shot

How to draw a bead on a mark

Sharpshooter Medal

If you don't know the best way to sight a gun and plug the target square in the bull's-eye, it will pay you to study the diagrams on this page. These diagrams are taken from the book of instructions furnished to members of the Winchester Junior Rifle Corps.

Instructions in alignment of sights, the three correct positions for shooting, rules for gun safety, are given to every member of the Winchester Junior Rifle Corps. Every fine point that makes for expert shooting is taught in this organization of expert boy Marksmen of America.

Start a W. J. R. C. "Unit" with your friends

Why not get together with half a dozen of your chums, join the Winchester Junior Rifle Corps and organize a regular Unit, which will be officially recognized by National Headquarters?

The W. J. R. C. will help you from start to finish in rigging up an indoor or outdoor range. It provides for officers, supervisors, and adult instructors to make your shooting safe. It costs you nothing to join the W. J. R. C. There are no dues and no military obligations. The W. J. R. C. was organized solely to encourage better marksmanship and better sportsmanship among boys and girls of America. Any boy or girl not over 18, who is in good standing in his or her community, is eligible.

Membership in the W. J. R. C. covers the United States. There is hardly a town now that has not at least a small "Unit" of the big National Organization where boys are learning to become expert riflemen and are competing among themselves for the famous Winchester Marksman, Sharpshooter and Expert Rifleman Medals.

Get the official plan and handbook

Write today for the Winchester Junior Rifle Corps "Plan for Organizing a W. J. R. C. Unit," and for the official handbook, "How to handle a rifle safely." This booklet tells you all about the W. J. R. C. and describes in detail the fine points of shooting.

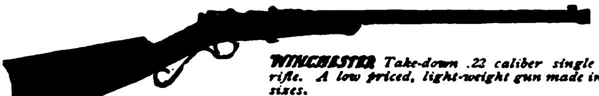
If you are a boy scout, give your name in full, the troop you belong to and the name of the Scout master.

If you are not a boy scout, state what boy organization, if any, you belong to, giving the name of the official in charge.

National Headquarters
WINCHESTER JUNIOR RIFLE CORPS
275 Winchester Avenue
New Haven, Conn., U. S. A.
Division 630

Standard types of .22 caliber Winchester Rifles, popular with members of the Winchester Junior Rifle Corps

WINCHESTER MODEL 06. Take-down Repeating .22 caliber rifle, 20-inch round barrel. Shoots three sizes of ammunition. The most popular .22 caliber repeater, used extensively by members of the W. J. R. C.



WINCHESTER Take-down .22 caliber single shot rifle. A low priced, light-weight gun made in two sizes.

WINCHESTER JUNIOR RIFLE CORPS

National Headquarters, 275 Winchester Ave., New Haven, Conn., U. S. A.
Division 630

Winchester Junior Rifle Corps
Nat'l Headquarters, 275 Winchester Ave.,
New Haven, Conn., U. S. A. Division 630

Gentlemen:

Please register my name as a member of the Winchester Junior Rifle Corps, and send me a membership button and certificate of membership. Also tell me how to organize a Local Unit of the W. J. R. C.

Very truly yours,

Name....................................

Street Address..............................

City....................... *State*..............

Temperature is a mighty force in your life

HEALTH—food—clothing—everything you use in daily life—practically everything you do—is dependent or influenced by temperature.

There's a safe temperature for the home and office, just as there is for baby's bath.

There's a temperature of the human body which indicates health. Another—sickness.

The most digestible, palatable foods are those prepared according to specific temperatures—not guesswork.

Human energy at home, in the office, in the shop, is influenced by temperature tremendously.

You want to know what the temperature of the room is, how cold it is outside, and whether the sick one has fever.

But to KNOW, to be able to control heat and cold conditions, you must have accurate and reliable aids. Guesswork won't do, it's dangerous.

In the manufacture of instruments ranging from the delicate fever thermometer to the Fery Pyrometer registering accurately into thousands of degrees, Tycos makers stand alone.

Tycos Temperature Instruments

For nearly 70 years we have been making recording, indicating and controlling instruments to fit every temperature need and purpose. We catalogue over 8,000 types and styles—conclusive proof of the variety of conditions temperature effects.

Every instrument that leaves our laboratories is all that science, skill, organization, experience, system, rigid inspection and infinite pains can make it.

Tycos Thermometers help you control it

527

Here are some of the many requirements of which you perhaps may not be aware:

That in the distillation of any liquid a thermometer is important.

That vulcanizing is vitally dependent on control of temperature.

That the temperature of developing and toning baths in photography is highly important.

That the TYCOS Fire Alarm Thermometer when installed in connection with bells and batteries is proving an efficient fire alarm. (Used by U. S. Navy on battleships).

What is your particular temperature problem?

Thermometers

- Armored
- Art Novelty
- Asphalt Testing
- Auto-Circulation
- Babies' Food
- Bakers'
- Bake Oven
- Bank
- Bath
- Bottle Testing
- Brine Pipe
- Brooder
- Butter
- Cabinet
- Calorimeter
- Candy Making
- Cellar
- Celluloid
- Chandelier
- Chemical
- Churn
- Clinical
- Coal Oil
- Cold Storage
- Cold Test
- Copper Cased
- Dairy
- Decorative
- Dental
- Desk
- Developing Bath
- Dial
- Display
- Distillers'
- Dough Testing
- Dry Kiln
- Electric
- Electric Alarm
- Engraved System
- Fat Testing
- Fever
- Frost Alarm
- Fruit Car
- Fruit Evaporating
- Gas Works
- Glass Angle
- Glass Window
- Greenhouse
- Ham Boiling
- Home Candy Making
- Hop Curing
- Hot Bed
- Hot Water Heating
- Household
- Hydrometer Can
- Laboratory
- Lithographed Tin Scale
- Mantel
- Maple Sugar
- Marine
- Mash Tub
- Mash Pipe
- Maximum
- Maximum and Minimum
- Meat Packers'
- Meat Testing
- Milk Pasteurizing
- Milk Sterilizing
- Minimum
- Orchard
- Oven
- Packing House
- Paper Weight
- Pasteurizer
- Photographers'
- Pipe
- Plate Glass
- Pocket
- Porcelain
- Precision
- Railway
- Railway Coach
- Radial Scale
- Recording
- Registering
- Refrigeration
- Sea Water
- Ship Hold
- Shower Bath
- Show
- Sick Room
- Six's Registering
- Sterilizing
- Sugar House
- Sugar Factory
- Test
- Titer Test
- Tobacco Curing
- Toning Bath
- Track Laying
- Traveling
- Veterinary
- Vulcanizing
- Weather Bureau
- Window
- Wood

Other Instruments

- Aviation Aneroids
- Barometers
- Calciometers
- Chargometers
- Clinometers
- Compasses
- Cream Gauges
- Freezometers
- Hydrometers
- Hygrometers
- Hygro Autometers
- Psychrometers
- Rail Gauges
- Recording Baro-Thermograph
- Saccharometers
- Salinometers
- Sphygmomanometers
- Sprayometers
- Stormagraphs
- Thermographs
- Transits

Mark the instruments above that interest you. Write your name and address on the page, send us the page. If instrument in which you are interested is not listed write us. Interesting descriptive literature will be sent you immediately.

Taylor Instrument Companies

Rochester, New York

There's a *Tycos* and *Taylor* Thermometer for every purpose

SARGENT

Takes the "slam! bang!" out of screen doors

Be kind to your nerves this summer: use Sargent Noiseless Screen Door Closers. Under all conditions, they will close screen doors gently yet swiftly, firmly yet quietly. They make locks and hinges last longer for there is no rebound on closing. Easily and quickly put on: strong and dependable always.

Sargent Locks and Hardware represent the utmost in protection and architectural harmony.

* * *

Sargent Auto-Set Bench Planes are made in six sizes. The cutter can be removed for whetting and replaced to exactly the same position without adjustment.

If not at your hardware store, write for booklets and the name of our nearest dealer

SARGENT & COMPANY
Hardware Manufacturers
49 Water St., New Haven, Conn.

LOCKS AND HARDWARE

Getting Soldiers back into overalls

As the generous and energetic co-operation of America's industries helped her to share in allied victory, so should those same industries now face a second patriotic duty.

When victory came, the INDIAN organization saw that second duty; helping America's fighters reap the benefits of their wartime training.

Almost simultaneously with the signing of the armistice, the INDIAN Soldiers' Service Department began its successful work of bringing together employers in the industry and those efficient and reliable motorcycle men now returning from service.

America's industries helped to mobilize America's forces—they may now be depended on to lighten the Government's task of demobilization.

Hendee Manufacturing Company
SPRINGFIELD, MASS.
The Largest Motorcycle Manufacturer in the World

Indian Motocycle

For Sale by Dealers Everywhere

"Take It From Me, Insist On B.V.D.!"
Copyright U.S.A. 1919 by The B.V.D. Company.

If it hasn't this Red Woven Label

MADE FOR THE
B.V.D.
BEST RETAIL TRADE
(Trade Mark Reg. U.S. Pat. Off. and Foreign Countries)

It isn't **B.V.D.** *Underwear*

A lot of comfort is worth a little insistence
Therefore-Insist upon getting
B.V.D.

B.V.D. *quality can only be obtained in* B.V.D *Underwear*

THE B.V.D. COMPANY
New York

B.V.D. Coat Cut Undershirts and Knee Length Drawers, $1.00 the Garment.

B.V.D. Sleeveless Closed Crotch Union Suits, (Pat. U.S.A.) $1.75 the Suit.

Copyright U.S.A. 1917 by The B.V.D. Company

Remember, all Athletic Underwear is not B.V.D.

Copyright U.S.A. 1917 by The B.V.D. Company

Let the Dayton Help you "Play".

Dayton Bicycles

Young and old—everybody must "play" a part of the time!

After work, on Sundays and holidays! That's the time for "play"! And nothing can add as much to these short hours as a Dayton Bicycle!

It will take you to the baseball diamond, the tennis court, golf links, fishing hole, and swimming hole quick as a wink. It gives you more time for "play"—and in itself is pleasure and recreation!

Let a Dayton Bicycle help you "play". You'll be proud of it in any company—for it is certainly good-looking!

All Dayton nickel-plating goes on over a heavy coat of copper.

The enameled surfaces, as you see them, represent, in all, some 17 processes—beginning with a bath in boiling lye and ending with the coat of varnish which completes the job.

Between these two operations are the anti-rust and filler coats, the rubbings, washing and bakings—and two coats of the famous Dayton Carmine! The Dayton finish retains its lustre and brilliance. It wears, and wears and wears.

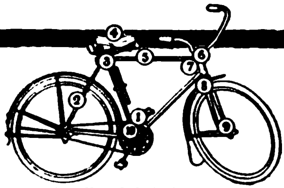
See the Dayton Line at your dealer's. Study the mechanical superiorities pointed out below. Our catalog describes and pictures the Dayton Line completely. It is free.

THE DAVIS SEWING MACHINE CO.
DAVIS MADE
DAYTON, OHIO.

We Back This Trade-Mark With Our Reputation

Write today for Catalog B-10

Cycle Dept., THE DAVIS SEWING MACHINE COMPANY, *Dayton, O.*



1 One-piece drop-forged cranks. Hobbed sprockets.

2 Special design rear fork, giving extra clearance between wheel and fork sides. Flush rear fork ends.

3 Drop-forged seat-post cluster, giving extra strong grip on seat-post.

4 High-grade padded leather saddle with double-action springs. Leather tool bag and complete tool equipment.

5 Seventeen-process enamel finish of Dayton Carmine. Tough and long wearing. Heavy coat of copper under all nickel plating.

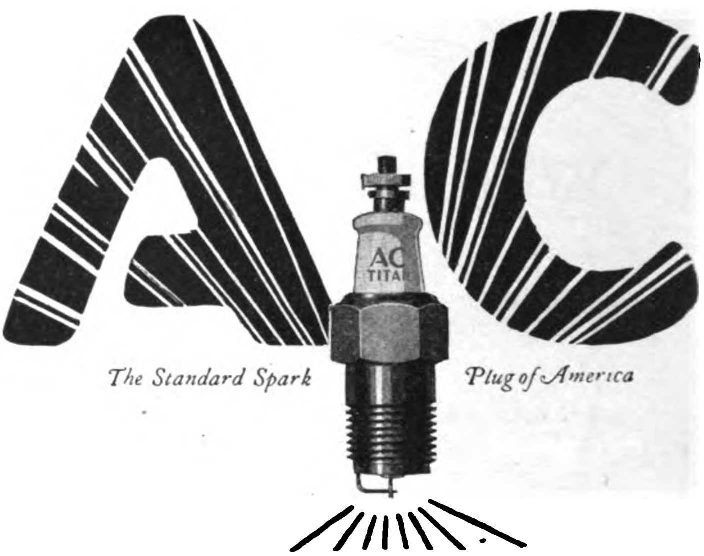
6 Dust-proof head adjusting cone. Extra large High-Duty ball bearings. Cones case-hardened in cyanide.

7 Outside joint head construction. Eleven inner reinforcements in frame, all dip-brazed.

8 Double-anchored fork sides with solid steel spool between plates.

9 Front hub and cups of special design turned from solid steel bar. Two-point frictionless bearings.

10 Seamless crank hanger bracket, extra reinforced.



Put an End to Your Spark Plug Troubles

Install a Complete Set of AC Carbon Proof Spark Plugs and See How They Improve the Performance of Your Car

Here is the spark plug you have been looking for—the AC Carbon Proof, for tractors, Fords, Overlands and Studebakers.

Put a set of these plugs in your motor and save gasoline, better its performance, get more power.

For AC Carbon Proof Plugs are spark plugs with the trouble removed.

They do not short circuit easily. They always deliver a big, hot spark. They are well insulated with finest porcelain that heat will not crack, that vibration will not break.

These plugs permit a full advance of the spark without that old, familiar engine knock. After you have installed them you notice immediate improvement in your car's performance. For you get higher engine speed with a smaller throttle opening than before.

That means a big saving in your gasoline bill.

More power, no carbon, better performance, gasoline saved.

Those are the advantages that AC Carbon Proof Plugs bring to you and they cost no more than the ordinary kind.

AC Carbon Proof Plugs are especially designed for tractors, Ford, Overland and Studebaker cars.

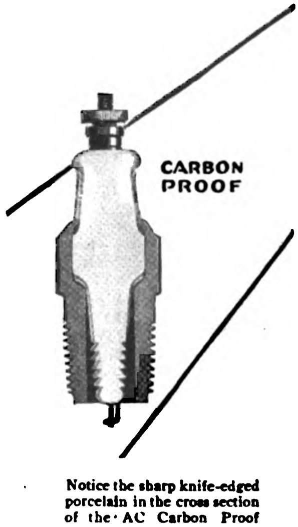
But no matter what car you drive there is an AC designed for it.

As you know well, most makers of fine cars use AC Spark Plugs for standard factory equipment.

An Government engineers during the war selected AC Spark Plugs of the same basic design as the plugs that these manufacturers have been using for years, as standard equipment on all Liberty and Hispano-Suiza Airplane Motors.

The spark plugs which served best in such emergency can be counted upon to serve you best also.

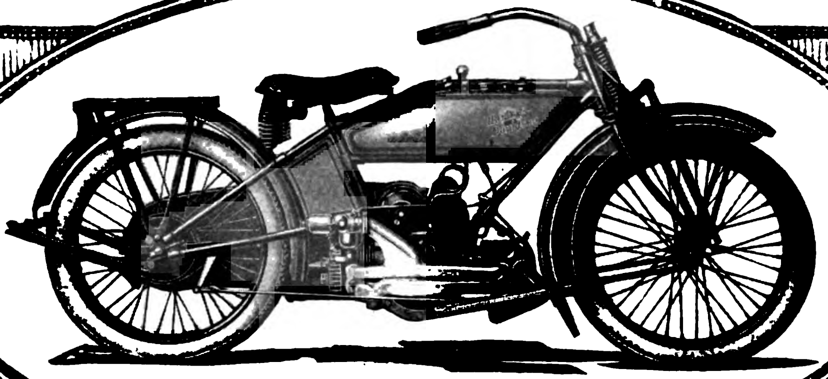
Write for The Spark Plug Story. It contains information of much value to you.



Notice the sharp knife-edged porcelain in the cross section of the AC Carbon Proof Plug here illustrated. That construction is the whole secret of this plug's success. These edges, being thin, heat rapidly. The heat burns off the carbon as fast as it forms. This is an exclusive AC design and fully covered by our patents.

Champion Ignition Company, FLINT, *Michigan*

U. S. Pat. No. 1,135,727, April 13, 1915, U. S. Pat No. 1,216,139, Feb. 13, 1917, Other Patents Pending.



The New Harley-Davidson Sport Model

A Horizontal Twin Harley-Davidson Lighter Weight Motorcycle

A powerful, swift, quiet, vibrationless, solo mount—with the sweetest running, cleanest engine ever built into a motorcycle.

That's what those who have ridden it say. You, too, will experience a new thrill and delight when you try it. You will marvel at its ease of handling and splendid riding balance, due to low center of gravity and low saddle position.

Its smooth, glide-away action, its get-away, its pep on the hills—all are due to its perfectly balanced opposed twin motor.

We know you will say it is the greatest achievement in motorcycle engineering.

Go to the nearest Harley-Davidson dealer and ask for a demonstration. Then, and then only, will you know what the Harley-Davidson Sport Model really is.

A Few of Its Features

Unit power plant with horizontal opposed cylinders.

100 pounds lighter than the average twin.

Super-heated, twin-cast manifold.

Drive chain enclosed.

Trussed cushion fork.

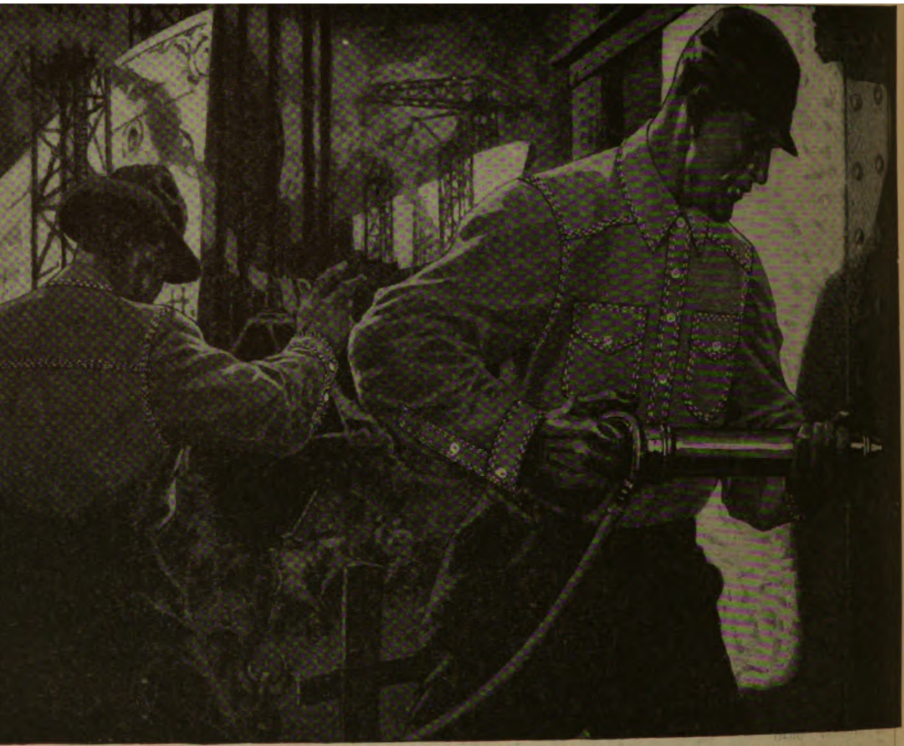
Automatic lubrication of motor, transmission and clutch.

Multiple disc steel plate clutch running in oil.

3-speed sliding gear transmission.

Spiral gear system of under-gearing.

Harley-Davidson Motor Co.
Milwaukee, Wis.



Comfort—Wear an "Old Faithful"

a world of good solid comfort for
who wears an "OLD FAITHFUL"
ile at work. It is built so large
out, yet fits so well, that you always
ise. "OLD FAITHFUL" is good-
too, and will outwear three ordi-
rts.

"OLD FAITHFUL" is triple-stitched on every strain seam and reinforced over the shoulder—has two extra wide, deep pockets with buttoned down flaps and you may choose from a variety of standard fabrics which include blue and grey chambray and black sateen.

RELIANCE WORK SHIRTS

ur dealer today and order one of
nous shirts. It will give you that
satisfaction that comes only from
standard article of known value.

Other familiar Reliance brands are the "Milton F. Goodman," "Black Beauty," "Army" and "Honor Bright" for boys. All of these good work shirts are sold by the best dealers.

RELIANCE MANUFACTURING COMPANY
WESTERN MADE WORK SHIRTS
CHICAGO

Stores E
$600 to
$3120 Yea
From a Little
Waste Space

Took in $10,000

"Have had our machine over 3 years and have taken in more than $10,000 on pop corn and peanuts."—Bloomington, Ill., population 26,850.

Bought Him a Car

"Profits derived from Butter-Kist machine first 12 months paid for machine and bought me a $1,200 automobile besides."—Electra, Tex., population 640.

Paid For Itself

"Paid for machine out of profits in less than year."—Mt. Pleasant, Ia., population 3,874.

Increased Other Sales 97%

"Made 49,015 sales of Butter-Kist pop corn and peanuts first year and it increased my sale of magazines 97 per cent."—Evansville, Ind., population 76,078.

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26 by 3

Pays

BUTTE

Pay From Your Profit

Our Easy Payment Plan gives every buy
to pay right out of his Butter-Kist sales a
have done.

Don't think you have to be located in
ter to make this machine pay. The be

Valuable ☞

This coupon has started many a busin
the road to new profits.

Each read an advertisement like this a
good horse-sense to know that it doesn'
thing but a postage stamp to investigate.

If this machine pays big profits in town
400 population as well as in the largest ci
man in business can afford to ignore it
coupon now for full facts and amazing suc

HOLCOMB & HOKE MFG. C
204 Van Buren Street
Indiana

Google

Ride a
Motorcycle

United States Cycle Tires are Good Tires

WHICH is the better way to get home from work—to pack into a crowded trolley car, or to get out into the clean, open air?

Only one answer to that, isn't there?

Boys and men who use motorcycles for business always know the advantage of good tires. They want United States Tires because they are always dependable. No unnecessary time is lost in repairs. They wear longer and are more economical.

United States Tires are made by the world's largest rubber manufacturer and every tire carries the U. S. Seal which means quality in rubber goods wherever you see it.

The 'Usco' Motorcycle Tire is the tire to use for long mileage and hard work. Ask to see it at any United States dealer's.

UNITED STATES RUBBER COMPANY
US
RUBBER SYSTEM
AND ASSOCIATED COMPANIES

"Makes its Mark
Around the World"
WATERMAN'S IDEAL NEW YORK
WATERMAN'S IDEAL NEW YORK
WATERMAN'S IDEAL FOUNTAIN PEN
CLIP-CAP
CLIP-CAP
WATERMAN'S IDEAL FOUNTAIN PEN

The STANDARD by which the world judges the quality and efficiency of a fountain pen

Waterman's Ideal Fountain Pen

3 TYPES
Regular
Safety
Self-Filling

$2.50 and up
At
Best
Dealers

Its readiness to write anywhere at any time without dependence upon desk or inkwell gives Waterman's Ideal Fountain Pen users a freedom of action, which enables them to do more and better work, suiting their own convenience as to time and place.

There is a nib to suit each and every individual character of hand writing—A size of barrel to fit any hand, and a type that meets perfectly any specific pen requirement.

A VACATION NECESSITY

Unties you from a desk and inkwell and puts handwriting on the list of out door sports

L. E. Waterman Company
191 Broadway
New York

CHICAGO BOSTON SAN FRANCISCO

GRAFLEX

The camera that does the difficult things in photography—and does them well.

It's raining as the ship you have come to welcome home is warping into the dock; the automobile racers are going by your point of vantage at a hundred miles an hour; a quick snap of the ball from pitcher's box to "first" has caught the runner napping; the children are romping at play on the half-shaded porch—impossible pictures for most cameras, but simple with a Graflex.

The Graflex catalogue—free at your dealer's or by mail—tells you why.

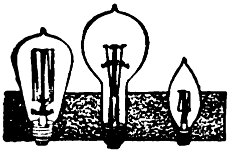
FOLMER & SCHWING DEPARTMENT
EASTMAN KODAK CO. ROCHESTER, N. Y.

MAZDA

"Not the name of a thing, but the mark of a service"

MAZDA is the trademark of a world-wide service to certain lamp manufacturers. Its purpose is to collect and select scientific and practical information concerning progress and developments in the art of incandescent lamp manufacturing and to distribute this information to the companies entitled to receive this service.

MAZDA Service is centered in the Research Laboratories of the General Electric Company at Schenectady, New York. The mark **MAZDA** can appear only on lamps which meet the standards of **MAZDA** service. It is thus an assurance of quality. This trademark is the property of the General Electric Company.



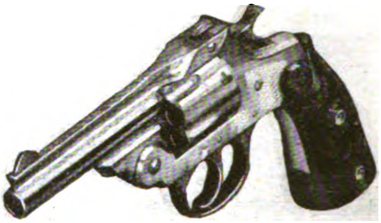
A **MAZDA** Lamp for every purpose

4646

RESEARCH LABORATORIES OF GENERAL ELECTRIC COMPANY

Who's There?

Late in the evening. The bell rings. Perhaps it's a telegram or special-delivery letter from her husband, who is away. Maybe it is a tramp. What will she do? If she has an Iver Johnson she goes to the door with perfect confidence. She has none of the fears and misgivings that she used to have before an Iver Johnson became her protector.



IVER JOHNSON

SAFETY AUTOMATIC REVOLVERS

are welcomed in thousands of homes where firearms of any kind have never been before, because they are absolutely safe. The most timid women handle the Iver Johnson without fear or nervousness because *they know* it cannot go off unless they pull the trigger all the way back. You could "Hammer the Hammer" of an Iver Johnson and it would not fire. Its safety is automatic; there are no levers to adjust or forget.

The Iver Johnson Revolver shown in this advertisement has the "Perfect" Rubber Grip. Other models have Regular or Western Walnut Grips. They are on sale at all hardware and sporting-goods stores.

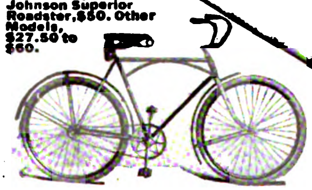
IVER JOHNSON'S ARMS & CYCLE WORKS
307 River Street, Fitchburg, Massachusetts
99 Chambers St., New York, 717 Market St., San Francisco

"HAMMER THE HAMMER"

Three Booklets Free

We have three booklets which are well worth reading by anyone interested in firearms, bicycles or motorcycles. Indicate which of these books you want: A—"Firearms," B—"Bicycles," C—Motorcycles."

Why not buy an Iver Johnson this Spring? Have fun, gain health, save money. Iver Johnson Superior Roadster, $50. Other Models, $27.50 to $60.



Champion Dependable Spark Plugs

Rigid Inspection Insures Dependability

AFTER Champion Spark Plugs have successfully gone through all the severe tests, such as the "Air Test" and the "Shock Test" that show them to be 100% leak-proof and 100% in durability — Then comes the rigid final inspection!

Long trained experts go over the plugs to make sure that every detail is right, and that there are no imperfections.

The skill and pains taken in this final inspection are characteristic of the care and thoroughness with which Champion Spark Plugs are made and tested.

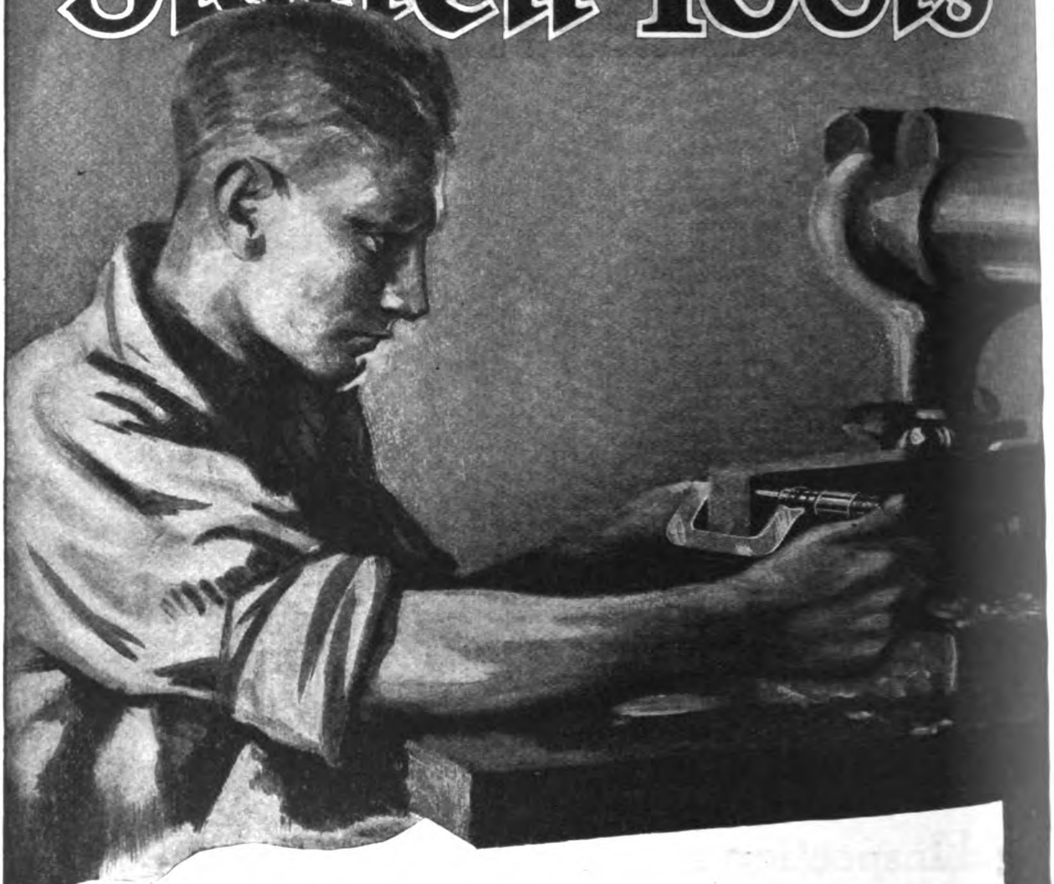
This care and thoroughness coupled with our famous No. 3450 Champion Insulator and our patented asbestos gasket construction, are responsible for the better performance of Champion spark plugs as compared to other plugs, and their greater resisting power to temperature changes and to shock and vibration.

An increasing number of car owners continue to learn the wisdom of insisting upon the spark plug with the name "Champion" on the Insulator and the world trade-mark on the box. This is *your* safe way to avoid substitutes.

Champion X
For Ford Cars
A15, Price 90c

Champion Spark Plug Company, Toledo, Ohio
Champion Spark Plug Company, of Canada, Limited, Windsor, Ontario

Starrett Tools



SINCE 1880—

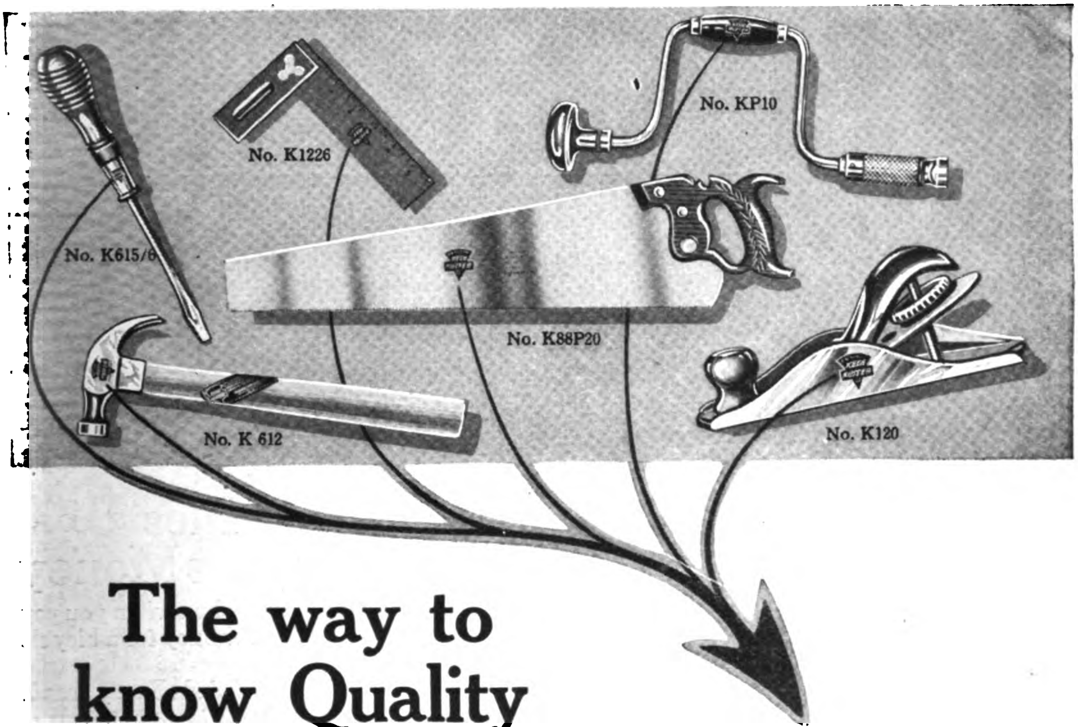
For two generations we have been making fine precision instruments—building them to the Starrett standard—not to a price.

Today the name Starrett is recognized the world over as standard for accuracy. Starrett Tools are helping skilled mechanics produce high-quality work.

Write for Catalog No. 21P.

The L. S. Starrett Company
The World's Greatest Toolmakers
Manufacturers of Hack Saws Unexcelled
ATHOL, MASS.

42-901



The way to know Quality in tools

You may not be thoroughly versed in the quality of steels or know how to select good tools as the mechanic selects them.

But if you will look for the KEEN KUTTER trade-mark on any tool you buy and insist on getting KEEN KUTTER you can be absolutely sure that the tool you get will be of the highest quality. Correct in design; efficient in use; durable as modern tool makers know how to make them.

KEEN KUTTER tools have been the choice of exacting professional builders and mechanics for years. They will be your choice, once you have tried "KEEN KUTTER" and realize their real superiority.

So look for the KEEN KUTTER trademark. It's easy to remember and well worth remembering.

KEEN KUTTER tools are on sale at leading hardware stores, everywhere.

E. C. SIMMONS
KEEN KUTTER
CUTLERY
AND
TOOLS

"The recollection of QUALITY remains long after the PRICE is forgotten."

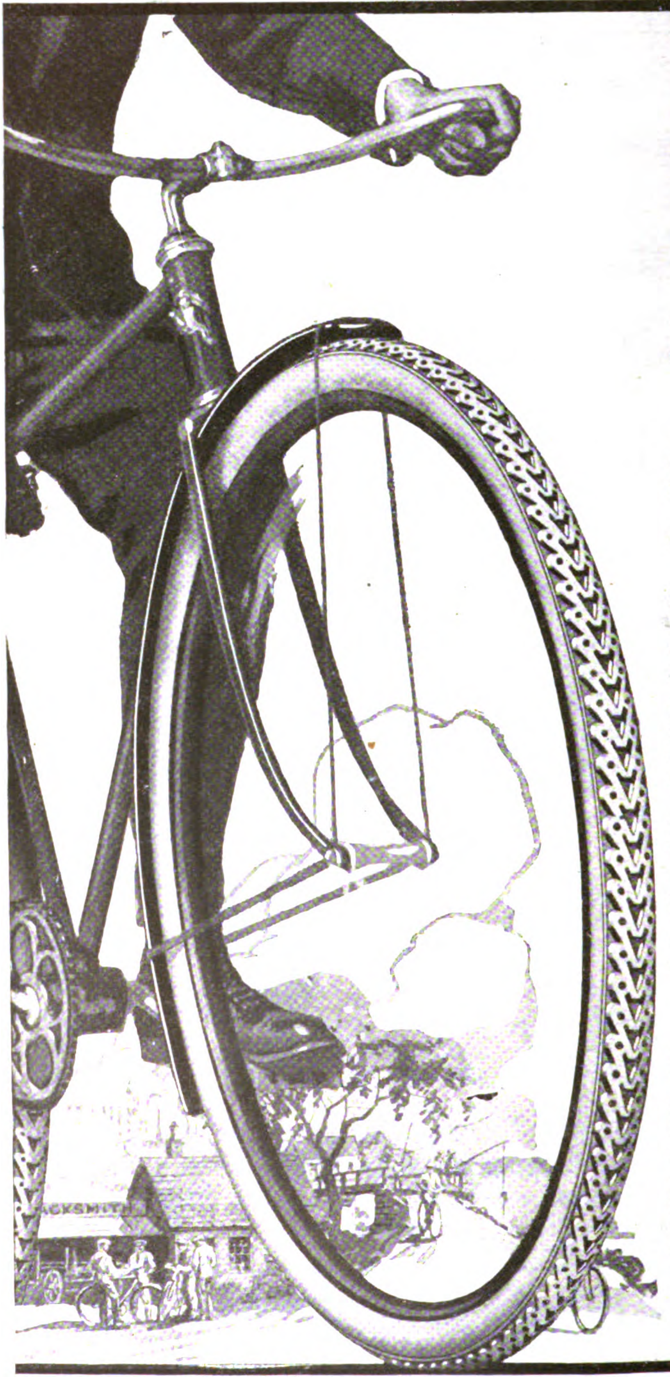
—E. C. SIMMONS.

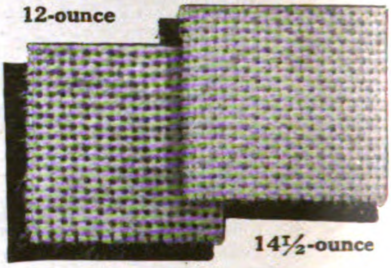
Trade Mark Registered.

SIMMONS HARDWARE COMPANY

VITALIC Bicycle Tires

(Trade Mark Registered)





More Miles for Less Money

What do you buy when you pay out your good money for a bicycle tire?

Rubber? Fabric? Fancy tread? Color? Looks?

Not on your tintype — not if you're wise.

What you really buy and pay for is *miles*—steady, comfortable, easy-riding, puncture-free, real road mileage. And by the same token the economy or extravagance of a bicycle tire is measured by miles and nothing else.

We could make, and you can buy, bicycle tires costing half as much as Vitalics—and they will give you just about a quarter of Vitalic mileage. We think it bad business to make that kind of tires. Do you think it good business to buy them?

Some Inside Information

All Vitalic Tires are made with an extra strong 14½-ounce fabric. The strongest fabric used in any other bicycle tire is 12-ounce — and most bicycle-tire fabrics are even lighter. Here is a magnified cross-section of 14½-ounce Vitalic fabric compared with an equally magnified cross-section of 12-ounce fabric.

TRADE MARK

"Tougher Than Elephant Hide"

CONTINENTAL
RUBBER WORKS
ERIE, PA.

ACT QUICK

Special Low Prices

SAVE MONEY

STANDARD UNDERWOODS

1
NEW ENAMEL
Frame restriped, relettered and newly enameled

2
NEW NICKEL PLATE
All type, type bars, etc., renickeled

3
NEW TYPE
All necessary new type—perfect print and alignment

4
NEW RUBBER FEET
New thumb knobs, new key rings, new rubber feet

5
BACK SPACER
We equip our machines with back spacers

Actual Photograph of My Rebuilt Underwoods

Rebuilt and Guaranteed for 5 Years

6
NEW PLATEN
Equipped with new platen—new feed roller—new ribbon

7
NEW SCALE FRONT
with many other features assures brand new typewriter service

8
TWO-COLOR RIBBON ATTACHMENT
rebuilt in our typewriters—every machine perfect

9
NEW KEYS
make our rebuilt typewriters look like new

10
NEW LETTERING
and you can't tell the rebuilt from a new typewriter

Study These 10 Important Rebuilt Features

They Double the Life of My Underwood Typewriters

All New Parts Where the Wear Comes — Every Machine Tested and Shipped Perfect

These 10 big, important, rebuilt features make it possible for you to buy a just-like-new standard, visible writing Underwood at special low prices. Act quick—investigate and learn how you can get 100% typewriter efficiency at a big discount. My (rebuilt) standard Underwoods are factory reconstructed by typewriter experts. New parts, new finish, new lettering, replace the old; everything made perfect—and the result—a typewriter the equal of any new machine in both service and appearance, just like the actual photograph shown above. And you may buy or rent my (rebuilt) Underwoods on ten days free trial backed by a five year guarantee. Just mail the coupon for all the facts.

I will Rent or Sell You My Standard Rebuilt Like New Underwoods with a 5 Year Guarantee

I offer liberal discounts on your old machines or rebuild them like new at money saving prices.

Besides the 10 features explained above I include many other improvements, such as a two-color ribbon, back spacer, stencil device, automatic ribbon reverse, tabulator, etc., and in addition I furnish free a waterproof cover and a special Touch Typewriter Instruction Book — all for my low price. It's a bargain and I want every typewriter buyer to know the facts. That's why I say — use my (rebuilt) Underwoods before you pay and prove it to yourself. Then after you buy, I guarantee every machine for Five Years. Buy or EARN AN UNDERWOOD FREE. Take advantage of my agency plan. Send coupon or write at once for Offer No. 52.

How I have Rebuilt and Sold 200,000 Perfect Typewriters at Factory Prices

The U. S. Government has purchased over 100,000 Standard Underwoods. The result is that Underwoods are scarce, but you can still buy my (rebuilt) Standard Underwood Typewriters guaranteed good as new. I sell only standard Underwood machines, purchased direct from the Underwood factory. They are then rebuilt in my factory (the largest of its kind in the world) with new parts, obtained direct from the Underwood Company. Send for prices.

You May RENT APPLYING RENT ON PURCHASE PRICE
OR BUY FOR CASH OR ON EASY PAYMENTS—

Buy My Factory Rebuilt Underwoods. Choose Your Own Terms After 10 Days Free Trial; Pay When You're Fully Satisfied

Prove to yourself at my risk that my (rebuilt) genuine standard Underwoods look, work and write like new. You don't even have to buy the machine, when you get it — try one of my Underwoods for 10 days free. It's the first step to cut your typewriter costs. Rent one at low monthly rates, then if you decide, after six months to buy, I'll allow you six months' rent and deduct it from my low price—or BUY it for cash, or get one on easy payments. But do so at once—ask for full facts now. Learn how I save you big money—mail the coupon today.

Send Coupon at Once and Save Big Money. Get the Facts NOW

25 years experience in rebuilding typewriters has taught me how to make my (rebuilt like new) Underwoods stand any mechanical typewriter test. Buy, rent or earn one of my Underwoods—10 days FREE trial. Save big money—investigate this offer. Write a letter, mail a postal or send this coupon — BUT ACT QUICK, if you want one. Get busy now.

E. W. S. SHIPMAN,
President

10 DAYS FREE TRIAL

Mail Coupon TODAY

E. W. S. SHIPMAN, Pres.
TYPEWRITER EMPORIUM,
34-36 W. Lake St., Chicago

Send me at once your Low Price Offer, rental and agency plan No. 52.

Name...

St. or R.F.D. No...

City...

State...

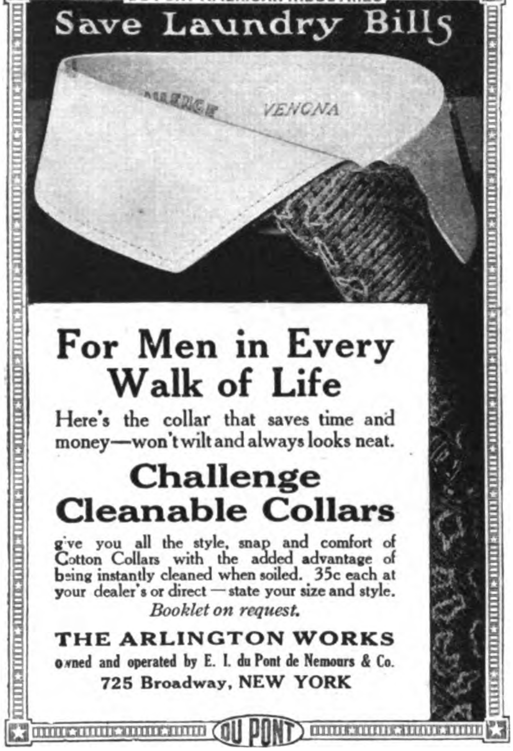
TYPEWRITER EMPORIUM

Established Over a Quarter of a Century
34-36 W. Lake St., Chicago

Remember I Back My Underwoods With My FIVE YEAR GUARANTEE

DU PONT AMERICAN INDUSTRIES

Save Laundry Bills



For Men in Every Walk of Life

Here's the collar that saves time and money—won't wilt and always looks neat.

Challenge Cleanable Collars

give you all the style, snap and comfort of Cotton Collars with the added advantage of being instantly cleaned when soiled. 35c each at your dealer's or direct—state your size and style.

Booklet on request.

THE ARLINGTON WORKS
owned and operated by E. I. du Pont de Nemours & Co.
725 Broadway, NEW YORK

DU PONT

Your Investment Opportunities
under the
Reconstruction Period

The foundations of many future fortunes are being laid through the judicious purchase of dependable securities at prevailing low prices. Every indication points to higher levels for meritorious stocks and bonds.

A twenty page publication issued fortnightly citing unusual opportunities in the stock market, free upon request. Write for 4-PM including our copyrighted booklet describing "The Twenty Payment Plan," the original easy-payment method of acquiring good values.

SLATTERY & Co
(Inc)
Investment Securities

40 Exchange Place, NEW YORK

BIG CUT
In Engine Prices

Not a cut in quality—but a definite money-saving reduction — All sizes — Gasoline, Kerosene, Portable Engines and Saw-Rigs, 2 to 30 H-P. I can sell for less because I make nothing but engines, buy materials for cash, and sell engines direct to users.

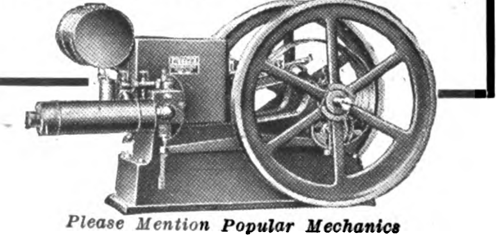
IMMEDIATE SHIPMENT

Let me send you my big new catalog and new reduced price list of kerosene and gasoline engines, FREE, postpaid—then you can judge for yourself. Buy NOW on practically your own terms—get your engine at once and save money. 33 years at it proves WITTE quality. My prices prove the saving. Write me today — **Get my offer.**

ED. H. WITTE, Pres.

WITTE ENGINE WORKS

1741 Oakland Avenue	**Kansas City, Mo.**
1741 Empire Building	**Pittsburgh, Pa.**

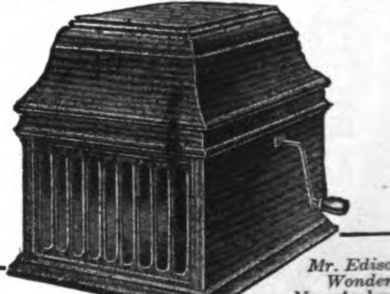


JOHNS-MANVILLE
Asbestos

COVERS THE CONTINENT

ENTER A BUSINESS of your own and earn big annual income in professional fees, making and fitting a foot specialty to measure; readily learned by anyone at home in a few weeks; easy terms for training, openings everywhere with all the trade you can attend to. No capital required or goods to buy, no agency or soliciting. *Address*

STEPHENSON LABORATORY, 1 Back Bay, Boston, Mass.

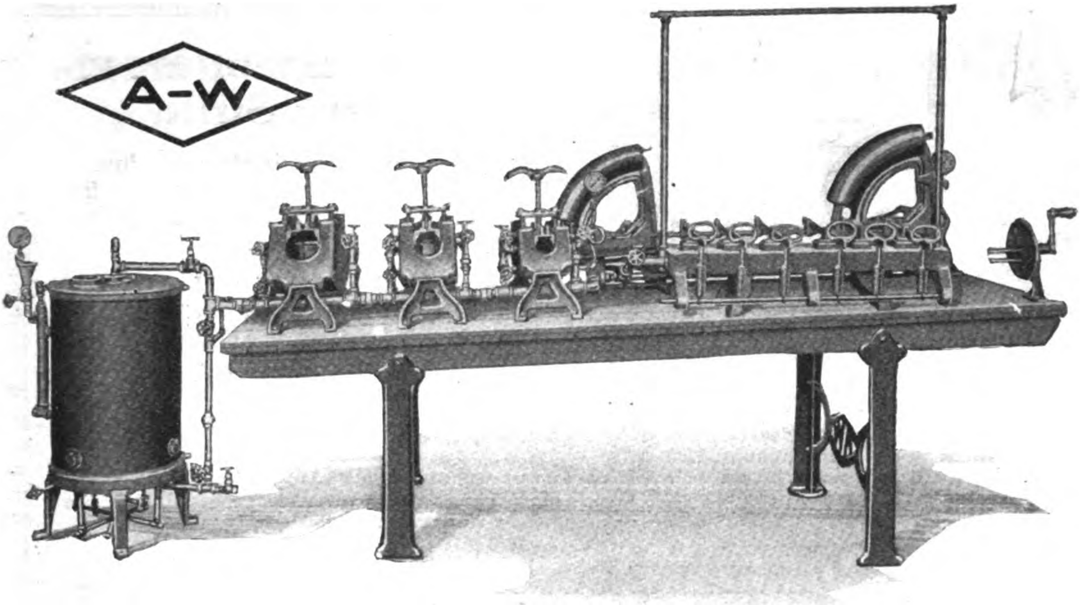


Mr. Edison's Wonderful New Amberola

Only $1.00 and After Trial

Keep the New Edison Amberola—Edison's great phonograph with the diamond stylus—and your choice of records, for only $1.00. Pay balance at rate of only a few cents a day. Free trial in your own home before you decide to buy. Nothing down. **Write for our New Edison Book** and pictures, free.

F. K. BABSON, Edison Phonograph Dists., A119 Edison Block, **Chicago, Ill.**



Get This Outfit

It Pays for Itself—Builds a Big, Profitable Tire Repair Business

If you're in the tire repair business or thinking of going into it, the Akron-Williams consulting engineers have a message for you. Write them today and get the complete story of what this Model R Tire Repair Outfit will do for you.

Makes your work easier.

Saves money by eliminating spoiled material.

Turns out perfect work the first time. No more "second time" jobs.

Pleases your customer because the repairs "stand up."

Builds business, because every Akron-Williams repair is a boost for more.

Space is lacking to list all the good individual features of this Model R Outfit.

But it includes equipment for doing all kinds of casing repairs on auto tires from 2 ½ inches to 5 inches. Includes also an inner-tube vulcanizer, tube deflator, two inside patch vulcanizers and steam generator.

You may need this complete outfit or you may need only one piece of vulcanizing equipment. Whatever you are planning, write us before deciding. Nothing is too large or too small for us to handle. From one sectional vulcanizer to equipment for a tire factory, Akron-Williams machinery is equal to the situation.

Let our consulting engineers help solve your tire repair equipment problems. Write us. No obligation to buy.

The Williams Foundry & Machine Co., Akron, Ohio

Everything in Tire Repair Machinery and Tools

Akron-Williams

Tire Repair Equipment

Mullins Steel Boats Can't Sink

BUILT like a lifeboat — and just as safe. Air-tight compartments fore and aft. Perfect balance, absolute stability — they can't sink.

Pressed steel hull, like a U. S. torpedo boat. Puncture-proof—can't leak, warp, waterlog or dry out. All the buoyancy of a wooden boat, but never needs calking or repairs.

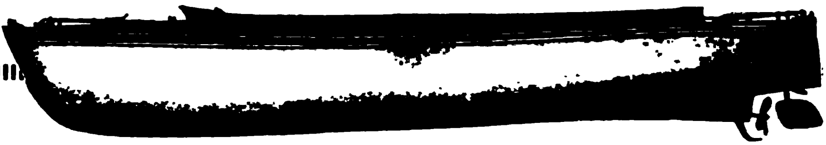
Over 65,000 Mullins boats now in use.

Write for our beautifully illustrated catalog, showing many models of steel and wooden rowboats, canoes and launches — designed by America's foremost naval architects.

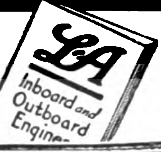
Mullins Outboard Special

Model shown above is ideal for short pleasure trips—fishing, hunting. Has bottom boards, rowing braces, pair of oarlocks and oars. Specially constructed for attaching outboard motor.

THE W. H. MULLINS CO., 655 Franklin St., SALEM, OHIO



Get this *LA* Engine Book



— it gives valuable information about motor boat engines. It also describes the full line of L-A motors and tells of the 30 days' free trial plan. *Write for your copy today.*

LOCKWOOD-ASH MOTOR CO.
1930 Horton Ave. Jackson, Mich. (22)

More Power-Greater Speed!

The **KOBAN** will "run away" from any other rowboat motor because its two cylinders produce more power. In every way, it is the motor for the man who demands real service and efficiency. The **KOBAN does not shake the boat,** because both cylinders fire at the same time, neutralizing the shock.

The Great 2-cylinder KOBAN ROWBOAT MOTOR

Only by this 2-cylinder opposed construction can you avoid the vibration that makes riding disagreeable, opens seams and ruins rowboats. Special tilting device for shallow water and beaching. For commercial work the **KOBAN** is unequalled. Used by U. S. Government and in 36 foreign countries.

We also make an inboard engine for small boats and canoes. Circular 80 tells all about it.

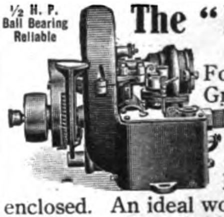
KOBAN MANUFACTURING CO.
291 South Water St., **Milwaukee, Wis., U. S. A.**

Write for catalog and full information.

Dealers and local agents wanted.

Engine User-Agents Wanted

Men wanted in every county to USE, demonstrate and sell "BIG BEN"—wonderful new gasoline engine for every work. Big demand. Liberal profits. Free details and introductory offer. C. Benninghofen & Sons, Department 611, Hamilton, Ohio.



The "Haffa-Hors" Engine

Gas or Gasoline

For running Cream Separators, Grain Graders, Churns, Washing Machines and other small tools. Foot Pedal Starter makes it as convenient as an electric Motor. All moving parts safely enclosed. An ideal woman's engine. Safe, Reliable and Economical. Sold under an absolute guarantee.

See local dealer or write us for Catalog

ELGIN GAS MOTOR COMPANY, 65 River St., ELGIN, ILL.

Makes Good beyond Your Hopes

because it is built on sound engineering principles all through.

Play Safe in Buying a Row-Boat Motor

you can't afford to take any chances. No matter what style of motor you require, there is a

Wisconsin Detachable Row Boat Motor

that will suit you. For six years this standard little motor has been making GOOD under all conditions—in the hands of thousands of users. And no wonder, when you examine its mechanical construction. It has a number of exclusive features that you should know about. Write for catalog TO-DAY.

WISCONSIN MACHINERY & MFG. CO.
19 Minor Street, Milwaukee, Wis.

EVINRUDE

Detachable Motor for Watercraft

With an Evinrude you can go quickly, *without rowing*, to the holes where big catches are almost sure. Distance makes no difference to an Evinrude owner.

Variable speed, suitable for trolling. Swift, smooth, flexible power for canoe, rowboat and other craft.

Built-in flywheel type magneto. Automatic reverse. Maxim silencer and tilt-up arrangement if desired. Our special method of balancing practically eliminates vibration.

Nearly 100,000 Evinrudes have already been sold. The Evinrude is used by 25 governments. *Write for Catalog.*

Evinrude Motor Company
38 Evinrude Building MILWAUKEE, WIS.

Distributors:
69 Cortlandt St., New York, N. Y.
214 State St., Boston, Mass.
436 Market St., San Francisco, Cal.
211 Morrison St., Portland, Ore.

Lost—A valuable key. Dropped it in the dark. Burned my fingers several times with lighted matches. Could have found it **instantly** with an Eveready DAYLO—the light that says, "There it is!"

MARINE ENGINES

3 H. P. single and 6 H. P. double cylinder, all iron or copper jacket, aluminum base, light weight, for canoes and small boats.
THE WATKINS MOTOR CO., 828 W. 6th St., CINCINNATI, OHIO

Universal MARINE MOTOR

Reliable Service

9-12 H. P. 4 Cycle 4-Cylinder. Speed range 300 to 1800 R. P. M. Adapted to boats from 14 to 30 feet. Write to

UNIVERSAL MOTOR CO.
OSHKOSH, WIS. Dept. P

For Bulletin No. 25 giving full description

The Days of Real Sport

A real, heart interest story of fishing back in your boyhood days. Illustrated by Briggs, the famous cartoonist. Gives practical detailed methods, helps and hints on the angling sport of today. Shows full line of South Bend Quality Tackle. Tells the "how" of bait casting. Every sportsman and dealer should have it. Write for it today. *Sent FREE.*

SOUTH BEND BAIT CO.
3587 Colfax Ave.,
SOUTH BEND, IND.

Racine Wis

America's Finest Canoe

Because it's built that way
Write for Complete Catalog
RACINE BOAT COMPANY
Dept. 61 Racine Wisconsin

"Old Town Canoes"

Fishing and Canoeing

—fine sport especially when the canoe is an "Old Town." Canoeing gives you the kind of healthy, vigorous alertness that our soldiers—used to outdoor life—showed in war. "Old Towns" are sturdy, speedy, buoyant, trim-lined and entirely safe. Send for catalog. Dealers everywhere.

OLD TOWN CANOE CO.
1866 Middle St. Old Town, Maine

"YOU'VE CERTAINLY GOT TO HAND IT TO HER!"
FOR SHE KNOWS A GOOD BRUSH
EFFECTIVE AND ECONOMICAL

WHITING-ADAMS
HOUSEHOLD BRUSHES

Guaranteed to live long and please all users.

Send for Illustrated Literature
JOHN L. WHITING-J. J. ADAMS CO., Boston, U. S. A.
Brush Manufacturers for Over 108 Years and the Largest in the World

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1919 ART PLAN BOOKS

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The Oliver Oil-Gas Burner makes any stove or range a gas stove. No coal or wood. Cooks and bakes better. No fires to start. You regulate flame. Saves money, work, dirt. Burns coal oil (kerosene). Simple, safe, easily put in or taken out. No damage to stove. Lasts a lifetime. Thousands of delighted users. In use 7 years. Write for free literature. **AGENTS WANTED**

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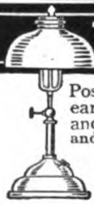

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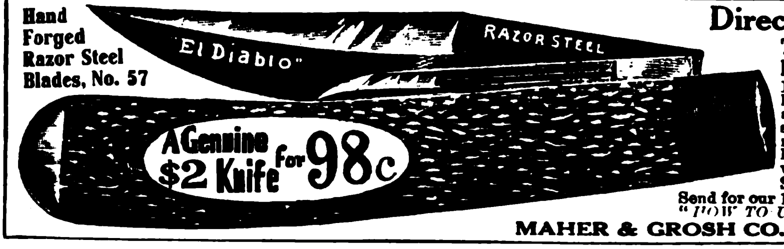
Hand Forged Razor Steel Blades, No. 57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Hand Forged Razor Steel Blades

Handy shaped blade makes this knife best for mechanics, sportsmen and farmers; light but strong; resharpened easily. Stag handle, German silver finish; blades file tested, hand forged from razor steel and warranted.

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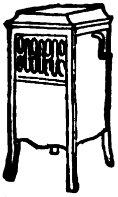

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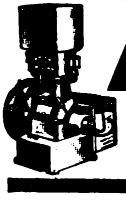

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Perfect machines, Standard size, full 84 character one motion keyboard. The entire line of writing completely visible at all times, has the tabulator, the two-color ribbon, with automatic reverse, the back spacer, ball bearing type bars, ball bearing carriage action, in fact every late style feature and modern operating convenience. **Comes to you with everything complete; tools, cover, operating book and instructions, ribbon, practice paper—nothing extra to buy. You cannot imagine the perfection of this beautiful reconstructed typewriter until you have seen it.** I have sold several thousand of these perfect latest style Model No. 10 machines at this bargain price and every one of these thousands of satisfied customers had this beautiful, strictly up to date machine on five days' free trial before deciding to buy it. I will send it to you F. O. B. Chicago for five days' free trial. It will sell itself, but if you are not satisfied that this is the greatest typewriter you ever saw, you can return it at my expense. You won't want to return it after you try it—you cannot equal this wonderful value anywhere.

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Little money to start. Part down—balance out of profits. We help you. This is the right time to start. Write for our money-making proposition. Send now.

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TRADE MARK REGISTERED

Get Rid of That Nasal Twang on *Your* Phonograph

This remarkable reproducer gives sounds their proper expression and rhythm. Its naturalness and warmth of color makes the sound a true "resurrection" of the original.

Applicable to any machine. You'll be delighted with it. Send $10 if nickel plated, or $12.50 if gold plated, and the RESURRECTONE will be sent postage paid. State make of instrument. Satisfaction guaranteed or money refunded.

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½ Price $2.50
SEND NO MONEY
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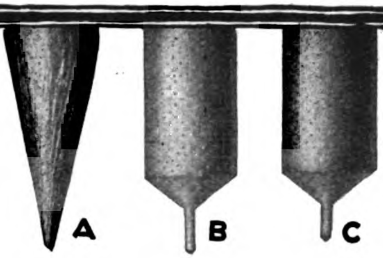

They replace steel phonograph needles!

SONORA Semi-Permanent Silvered Needles are for use on ALL MAKES of steel needle records. They *play 50 to 100 times,* mellow the tone, are more economical, more convenient, save constant needle changing, and increase the life of the records.

THE INSTRUMENT OF QUALITY

Sonora

CLEAR AS A BELL

Semi-Permanent Silvered

NEEDLES

Study these photomicrographs. Fig. A shows an ordinary steel needle after playing one record. Notice that the point is worn off. Fig. B shows Sonora Needle after playing one record. No wear is perceptible. Fig. C shows Sonora Needle after playing over 50 records. Needle has shortened but is still in perfect playing condition.

3 Grades: Loud—Medium—Soft
30c per card of 5. In Canada 40c.

FREE!

Sample Sonora Needle will be sent FREE on request. Write for it *today.* Note how many times it plays.

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GEORGE E. BRIGHTSON, PRESIDENT

279 Broadway, *Dept. E,* New York
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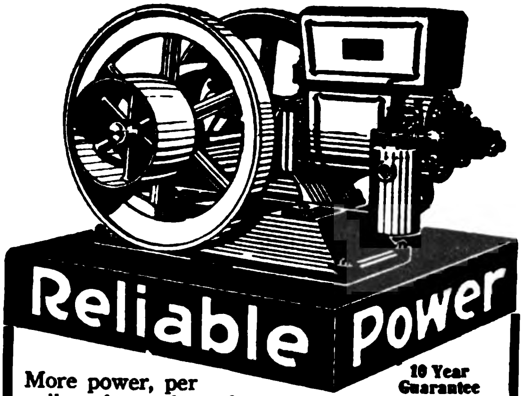
CAUTION! Beware of similarly constructed needles of inferior quality



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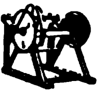

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You can put it together with a wrench.
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The quality of the ice is immaterial, as it does not come into contact with the water. This construction reduces the amount of ice and water required to a minimum.

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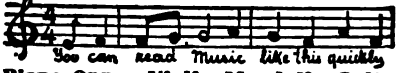

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$388 BUYS THIS "PRESTO-UP" Bolt-Together House

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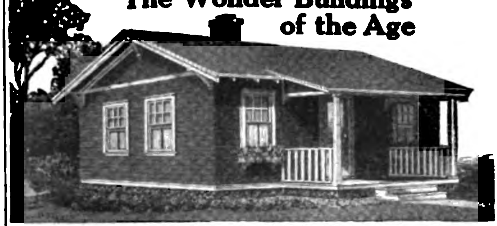

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Purchased after most rigid inspection by some of the largest Steel, Coal and Industrial Corporations in the United States. You are not experimenting. "PRESTO-UP" Bolt-Together Houses are patented, manufactured exclusively by us and sold at money saving prices.

Seven different types of walls to choose from. Wind and weather proof. Invisible joints inside and out. Extremely simple to bolt together. Wonderful strength. Better construction than regularly constructed houses. Exceptionally good lumber. Cement coated nails. Fifteen Year Guaranteed Slate Coated Roofing. Well painted, and best of all, neat in appearance and so simple to bolt together that it is a pleasure to do the work.

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Houses—Garages—Barns—Out Buildings, etc.
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Police departments, factories and industries everywhere are adopting this system of identification. Experts needed at once. You can train yourself in spare time at home. Write for details.

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Ask local tailors to make a pair of fine blue serge pants for less than $5 or $6 and see what they tell you. And yet our price is only $1.65. We positively guarantee a perfect fit and your complete satisfaction or **money back.** Remember we make all Suits, Pants and Overcoats tailor-made to order, to your individual measurements and no extra charge of any kind for novelty features.

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Weighing 3/4 CARAT $35

AMAZING VALUE!

Starting with this diamond solitaire weighing ¾ carat for $35.00 we are offering the largest and strongest list of diamonds ever offered in the country. This special is but one of the many thousands of equally remarkable values described in our 280-page catalog—sent free on request. When you buy diamonds from a retail jeweler you pay three unnecessary profits and this is absolutely eliminated when you buy from us.

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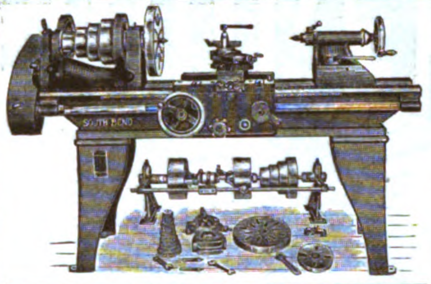

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For the Machine and Repair Shops

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15" " . . . 336.00	21" " . . . 771.00
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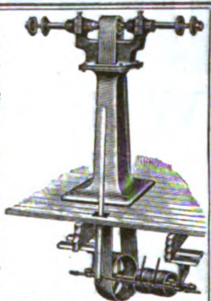
Made with straight or gap bed. Price includes equipment as shown in illustration. **South Bend Lathes have been on the market twelve years. Over 20,000 in use.** EST. 1906.

Free catalog mailed on request.

SOUTH BEND LATHE WORKS, 423 E. Madison St., SOUTH BEND, IND.

Did you ever wish to drive a Grinder or Polishing machine from the floor below?



If so you probably had considerable trouble getting a machine arranged for the purpose. The designer of the ST. LOUIS line has had the experience, so knew how to eliminate all the annoying features.

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SAINT LOUIS MACHINE TOOL CO.
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SEBASTIAN LATHE

FOR 30 YEARS

10 to 15" swing. Write for catalog.

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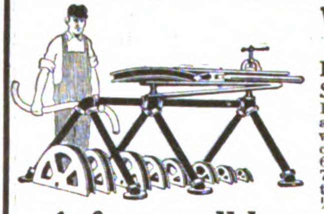

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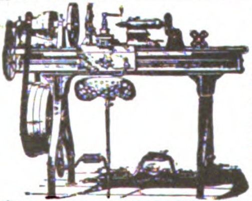

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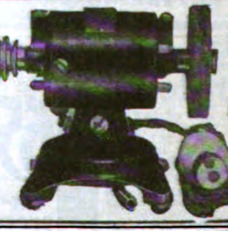

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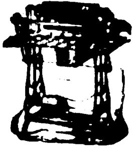

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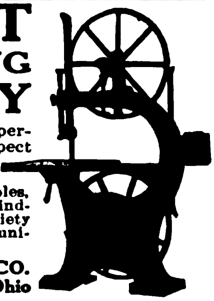

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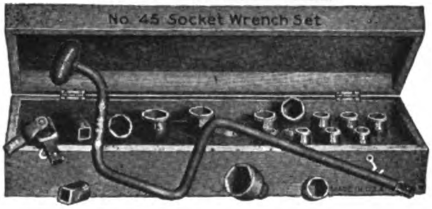

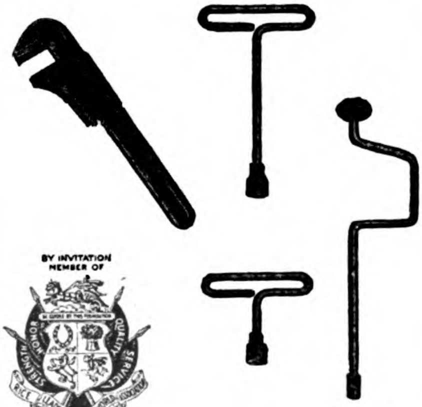

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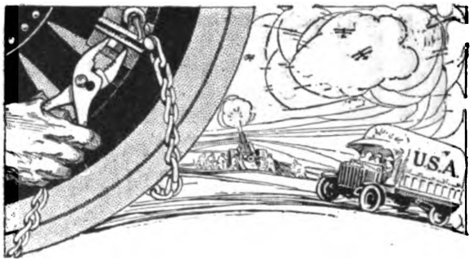

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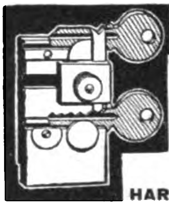

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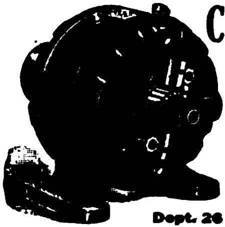

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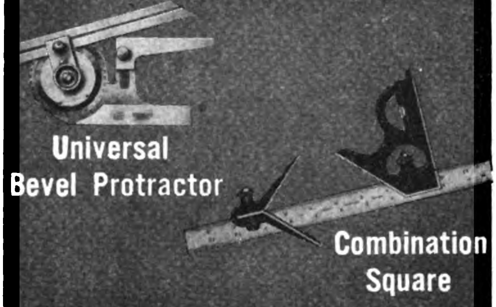

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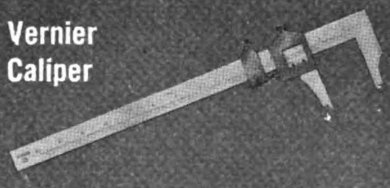
We have a catalog that will interest you — send for No. 27



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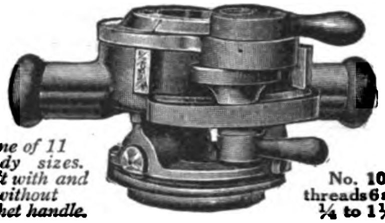
OSTER BULL-DOG DIE STOCKS



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No. 102
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¼ to 1¼"

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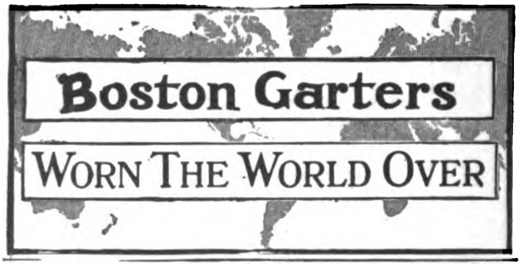

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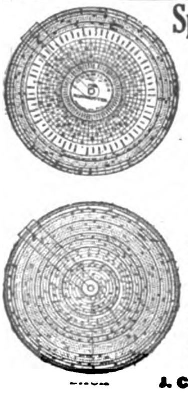

The Hamilton improved circular slide rule has over 8000 graduations and over 1800 figures and letters on it, and is an Engineer's hand book and slide rule combined. It is 5.4 inches in dia. It will subtract, divide, multiply, and add fractions or decimals of an inch; can be used as a decimal equivalent table, constructed of three disks and double transparent celluloid rider. Decimal equivalents given to six places in figures; gives sines, co-sines, tangents, co-tangents, secants, co-secants, versed sines, co-versed sines, square, cube, and fifth roots with all their powers; finds the area, circumferences and dia. of circles directly. The Log. scale has 1000 graduations. The DE LUXE rule may be bent double without injury; try this with rigid material such as metal; has no clumsy operating attachments and will work proportions. The KON-VER-TER is artistic as well as useful. In use all over the U. S., Canada, Mexico, Cuba, Porto Rico, Panama, Bermuda, Hawaii, Philippines, Australia, and New Zealand. Instructions with each rule. Beautiful gold embossed black leatherette case, 50c extra. **Plain Utility Rules, $1.00; Special De Luxe Rules,** white ivory celluloid, **$2.50 ppd.**

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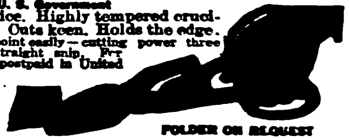

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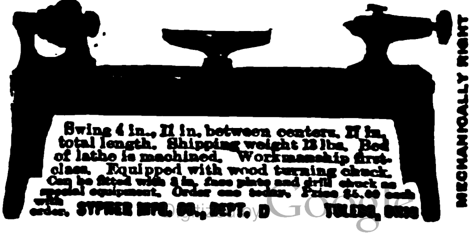

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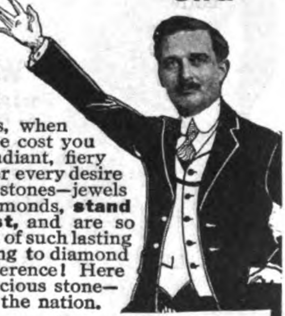

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To see the LIBERTY GEM you need not send one penny in advance. From catalog select the size and style of mounting. After examination, if you wish to wear the gem, deposit small first payment of Easy Terms. **After wearing 30 full days,** if you decide the LIBERTY GEM is not entirely satisfactory, return it at my expense and your deposit will be instantly refunded.

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The story of LIBERTY GEMS reads like fiction, but every word is true. This most interesting story is in a beautiful catalog showing a wonderful assortment of LIBERTY GEMS mounted in the latest and most up-to-date **14 Karat Solid Gold Rings and Jewelry. The book is Free.** Send your name and address--no obligation.

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Dear Sir:—

Send me, without obligation, Catalog of LIBERTY GEMS—FREE Test offer—introductory direct prices; and Easy Terms.

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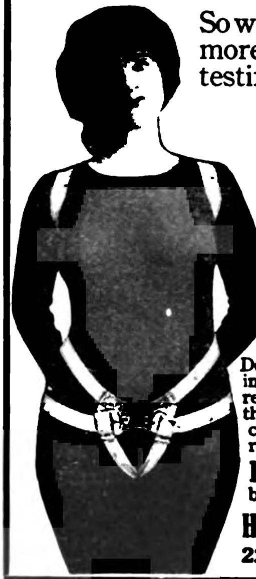
SAVE YOUR BODY

Conserve Your Health and Efficiency First

"I Would Not Part with it for $10,000"

So writes an enthusiastic, grateful customer. "Worth more than a farm," says another. In like manner testify over 100,000 people who have worn it.



The Natural Body Brace

Overcomes **WEAKNESS** and **ORGANIC AILMENTS** of **WOMEN AND MEN.** Develops **erect**, graceful figure.

Brings restful relief, comfort, ability to do things, health and strength.

Wear It 30 Days Free at Our Expense

Does away with the strain and pain of standing and walking; replaces and supports misplaced internal organs; reduces enlarged abdomen; straightens and strengthens the back; corrects stooping shoulders; develops lungs, chest and bust; relieves backache, curvatures, nervousness, ruptures, constipation. Comfortable and easy to wear.

Keep Yourself Fit Write today for illustrated booklet, measurement blank, etc., and read our very liberal proposition.

HOWARD C. RASH, Pres. Natural Body Brace Co.
223 Rash Building SALINA, KANSAS

For Boys and Girls Also

Automatic Fibro Limbs

Easy Payments — Do Nature's Work.
AGENTS WANTED who use Artificial Leg. GOOD PAY.
FREE Fibro Sample.
DESCRIBE STUMP TO **WORMAN CO.** 322 ANDRUS BLDG., MINNEAPOLIS, MINN.

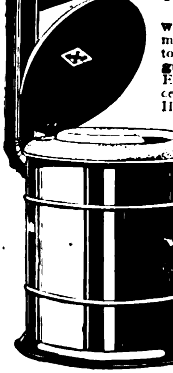
How to Get Rid of Moles

A simple, safe home treatment—15 years' success in my practice. **Moles** (and other growths) **Dry Up.**

Ask for Free Booklet of Full Particulars.

WM. DAVIS, M.D.
4141 State Street PERTH AMBOY, N. J.

RO-SAN Indoor Closet



Absolutely ODORLESS

Put It Anywhere in the House

The germs are killed by a chemical process in water in the container, which you empty once a month. **Absolutely no odor.** No more trouble to empty than dishwater. **Closet absolutely guaranteed.** Write for full description and price. Eliminates the out-door toilet, open vault and cesspool. They are breeding places for germs. Have a warm, sanitary, odorless toilet right in your house. No going out in cold weather. A boon to invalids. **Endorsed by State Boards of Health.** W. M. Davis writes: "Your Indoor closet is giving absolute satisfaction. It is certainly the thing for a home without sewerage."

More Comfortable, Healthful and Convenient than the Out-Door Toilet

AGENTS—DEALERS WANTED—ALL COUNTRIES

A wonderful opportunity for wide-awake men. Good margin of profit. Write for special proposition.

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Ask about the Ro-San Washstand — Hot and Cold Running Water Without Plumbing

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GET WELL—BE YOUNG—GROW TALL

This University discovery has gained the unqualified approval of the foremost physicians of all schools. It restores the mechanical integrity of the body. Eliminates diseases arising from congestion of blood and lymph, contractured muscles and ligaments, depleted cartilages, impinged nerves. A cure for old age. It will increase the length of the human body. **THE PANDICULATOR CO., 1514 Prospect Av., CLEVELAND, O.**

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I know because I was Deaf and had **Head Noises** for over 30 years. My invisible Antiseptic Ear Drums restored my hearing and stopped Head Noises, and will do it for you. They are Tiny Megaphones. Cannot be seen when worn. Effective when Deafness is caused by Catarrh or by Perforated, Partially or Wholly Destroyed Natural Drums. Easy to put in, easy to take out. Are "Unseen comforts." Inexpensive. Write for Booklet and **my sworn statement** of how I recovered my hearing.

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Don't Wear a Truss

MR. C. E. BROOKS

Brooks' Appliance, the modern scientific invention, the wonderful new discovery that relieves rupture, will be sent on trial. No obnoxious springs or pads.

Brooks' Rupture Appliance

Has automatic Air Cushions. Binds and draws the broken parts together as you would a broken limb. No salves. No lies. Durable, cheap. Sent on trial to prove it. Protected by U. S. patents. Catalog and measure blanks mailed free. Send name and address today.

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will free you of tax on your health and efficiency that pain causes. The pain of headache, neuralgia, indigestion, and colds, should be stopped at once, the Doctors will tell you, because pain is a shock to the nervous system that menaces health. It taxes your endurance and causes dangerous over-fatigue. You should stop it at once. Take wholesome, pleasant Orangeine, a physician's prescription that has been helping millions to efficient, good health by relieving their pain for twenty-five years.

The Physician's Prescription Is On Every Package

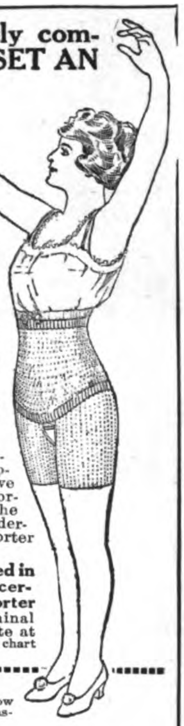
so you may "know what you're taking." No opiates. Insist on Orangeine. At druggists anywhere for convenience—and in homes everywhere for emergency. Keep it on hand at all times for quick relief. Tablet or powder form.

Prices Per Package
Powders, 10c—25c ***Tablets, 15c—25c***

ORANGEINE CHEMICAL COMPANY, CHICAGO

(4)

Beautiful face and lovely complexion DO NOT OFFSET AN UNGAINLY FIGURE



Women in every clime strive to preserve or achieve a graceful figure and erect carriage, yet thousands are fighting against fearful odds on account of improperly supporting the vital parts—the abdomen.

Women who realize that style and good health may go hand in hand, should use the Goodform Reducer-Supporter to the exclusion of anything else as assistance in affording that grace of carriage—that beauty of line—that equipoise of bearing—that additional support which corsets and ordinary supporters do not give. The result being, better health, and a consequence, still greater beauty.

Note the picture here produced—illustrating how the Goodform Reducer-Supporter clings closely to the body—observe the marvelously beautiful figure—the correct carriage—the beauty of form, the charming poise, and then you can understand why the Goodform Reducer-Supporter is in such great favor with the ladies.

SUPPORT and PROTECTION afforded in The Newly Patented "GOODFORM" Reducer-Supporter

Free If you use any kind of abdominal protector, or if you should, write at once for **FREE** detailed information, anatomical chart and pictures of this wonderful invention.

FREE INFORMATION COUPON

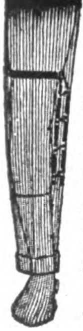
GOODFORM MFG. CO., 1026 Mills Bldg., St. Louis, Mo.

I require abdominal protection, and wish to know all about your patented GOODFORM. My waist measure is inches.

Name ....

Address ....

Bowlegged Men



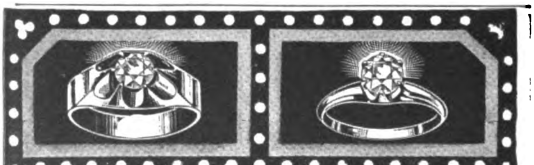
Your legs will appear straight when you wear

Straightleg Garters

Combination hose-supporter and pantleg straightener — **Quickly adjusted to fit various degrees of bowlegs;** as easy to put on and comfortable to wear as any ordinary garter — **no harness or padded forms;** just an ingenious special garter for bowlegged men — improves appearance wonderfully. Wearers are enthusiastic. You will be too. Write for free booklet, mailed in plain envelope.

S-L GARTER COMPANY

726 Trust Co. Bldg. DAYTON, OHIO



"Finer Than a Diamond"

R. H. G. of Carlisle, Pa., writes: "I like my Lachnite ring better every time I look at it. I think it is finer than a genuine diamond."

Send No Money Just send your name and finger size, we'll send a Lachnite ring, set in solid gold, prepaid, right to your home; when it comes deposit $4.75 with the postman, and wear the ring for ten full days. **If you, or any of your friends can tell it from a diamond, send it back.** If you return the ring in ten days we will return your deposit immediately. But if you decide to keep it, send $2.50 a month until $18.75 has been paid.

Write Today Send your name now. **Tell us which of the solid gold rings illustrated above you wish** [ladies' or men's]. Be sure to send your finger size.

Harold Lachman Co., 12 N. Michigan Ave., A119 Chicago

STOP USING A TRUSS

Do Away With Steel And Rubber Bands

FREE TRIAL

Inner surface is made adhesive to secure the PLAPAO-PAD firmly to the body, keeping the PLAPAO continually applied and the pad from slipping. No straps, buckles or springs attached. Soft as velvet—easy to apply.

It's the Non-Slipping, yet Non-Rigid Pad and What is Within It That Counts

FREE to 5,000 Truss Sufferers

To the extent of 5,000 sufferers who may apply I will send, ABSOLUTELY FREE, a sufficient quantity of the Plapao to positively convince them that this is the only logical, common-sense way of treating rupture. Plapao is a highly astringent medication placed within the Plapao-Pad and being absorbed through the skin, creates a wonderful feeling of relief and at the same time tends to strengthen the weakened muscles and thus permanently close the rupture opening. The process of recovery is natural, so you'll have no use for a truss—you can throw it away forever! Old and young have testified under oath that the Plapao-Pads cured their rupture—many of them long-standing, aggravated cases—without delay from work. Patent allowed in U. S. and foreign countries. Awarded Gold Medal at Rome and Grand Prix at Paris.

Send No Money—for a sufficient quantity of the Plapao is sent without charge to enable you to give it a thorough test; you pay nothing for this trial now or ever. Write for it and full information today. Address

Plapao Laboratories, Block 1427 St. Louis, Mo.

FIBRE LEGS ARMS

4-LB. FIBRE LEGS—ON EASY TERMS

Orthopedic braces for all deformities. Send for booklet.

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AGENTS $60 WEEKLY

Robinson Folding Bath Tub. Big seller. Costs little, no plumbing, little water. Weight 15 pounds, folds into small roll. Full length baths, far better than tin tubs. Guaranteed 10 years. $10 a day easily made. Write for free tub offer.

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WRITE TODAY for OUR 168-PAGE *FREE* BOOK on

Deafness

and learn how Perfect Hearing is now being restored in every condition of deafness or defective hearing. Our "*Little Wireless Phones for the Ears*" require no medicine, but effectively replace what is lacking or defective in the natural ear drums. They are simple devices, which the wearer easily fits into the ears, where they are invisible. Soft, safe and comfortable.

WILSON EAR DRUM CO., Incorporated

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NO MORE BALD HEADS

When our VACUUM CAP is used a few minutes daily. We accept no pay until you have tried the Cap 60 days and are satisfied. The Vacuum Cap is an appliance that draws the blood to the Hair Roots and starts a new healthy crop of hair. It stops Dandruff, stops the hair from falling out. Bought by Doctors and men who know that it is the only reasonable HAIR GROWER known to science. No Drugs Used. Write for application blank, testimonials, and booklet on "HAIR," sent sealed in plain envelope, FREE.

THE MODERN VACUUM CAP CO.

0. 559 BARCLAY, DENVER, COLO.

Tobacco Tells on Nervous System
Tobacco Ruins Digestion
Tobacco Stunts Boy's Growth
Tobacco Robs Man of Virility
Tobacco Steals from You the Pleasures, Comforts, Luxuries of Life

Tobacco Habit Banished In 48 to 72 Hours

Immediate Results

Trying to quit the tobacco habit unaided is a losing fight against heavy odds, and means a serious shock to your nervous system. So don't try it! Make the tobacco habit quit you. It will quit you if you will just take **Tobacco Redeemer** according to directions.

It doesn't make a particle of difference whether you've been a user of tobacco for a single month or 50 years, or how much you use, or in what form you use it. Whether you smoke cigars, cigarettes, pipe, chew plug or fine cut or use snuff—**Tobacco Redeemer** will positively remove all craving for tobacco in any form in from 48 to 72 hours. Your tobacco craving will begin to decrease after the very first dose—there's no long waiting for results.

Tobacco Redeemer contains no habit-forming drugs of any kind and is the most marvelously quick, absolutely scientific and thoroughly reliable remedy for the tobacco habit.

Not a Substitute

Tobacco Redeemer is in no sense a substitute for tobacco, but is a radical, efficient treatment. After finishing the treatment you have absolutely no desire to use tobacco again or to continue the use of the remedy. It quiets the nerves, and will make you feel better in every way. If you really want to quit the tobacco habit—get rid of it so completely that when you see others using it, it will not awaken the slightest desire in you—you should at once begin a course of **Tobacco Redeemer** treatment for the habit.

Results Absolutely Guaranteed

A single trial will convince the most skeptical. Our legal, binding, money-back guarantee goes with each full treatment. If **Tobacco Redeemer** fails to banish the tobacco habit when taken according to the plain and easy directions, your money will be cheerfully refunded upon demand.

Let Us Send You Convincing Proof

If you're a slave of the tobacco habit and want to find a sure, quick way of quitting "for keeps" you owe it to yourself and to your family to mail the coupon below or send your name and address on a postal and receive our free booklet on the deadly effect of tobacco on the human system, and positive proof that **Tobacco Redeemer** will quickly free you from the habit.

Newell Pharmacal Company
Dept. 300 St. Louis, Mo.

Free Book Coupon

NEWELL PHARMACAL CO.,
Dept. 300 St. Louis, Mo.

Please send, without obligating me in any way, your free booklet regarding the tobacco habit and proof that **Tobacco Redeemer** will positively free me from the tobacco habit.

Name..

Street and No..

Town.................................... State........................

Are You Fit or Fat?

Lose your fat without losing your health and feel good while doing it, by wearing

Professor Charles Munter's

Nulife
Abdo-Vibro BELT
For Men, Women and Children

NULIFE REDUCES THE STOUT

NULIFE DEVELOPS THE SLIM

NULIFE ABDO-VIBRO BELT

COMPELS DEEP BREATHING

Feels like rubber, supports like a bandage, does not slide up or down

Reduces the abdomen | **Straightens round shoulders**
Expands the chest | **Supports the back and spine**
Develops the lungs | **Improves the circulation**

Makes you stand, sit, walk and grow erect

NULIFE gives an internal massage with nature's tonic—fresh air

Send us $3.00 today with your height, weight and waist measurement taken over your undergarments, with your abdomen drawn in and state sex; we will send you our NULIFE ABDO-VIBRO BELT by parcel post prepaid and guarantee it to do all we claim of it or your money will be cheerfully refunded.

Address Dept. 60, NULIFE COMPANY
122-124 Fifth Ave. New York, N. Y.

Write for booklet "The Benefits of Deep Breathing." Sent free upon request

Agents and representatives wanted in every city; no experience necessary

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Agents: $50 a Week

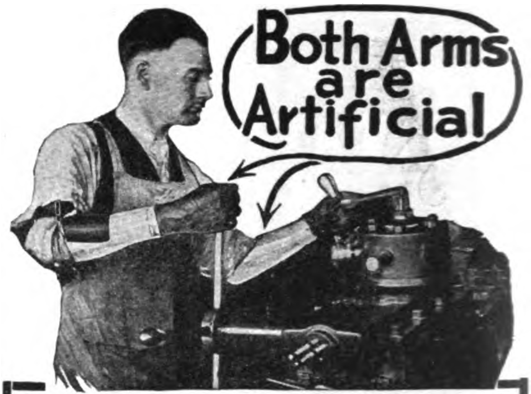
No-Bang Door Check

For screen doors, storm doors, office doors. A prospect for one or more in every home, store, grocery, bakery or office. Stops the bang and saves the door.

KEEPS FLIES OUT OF THE HOUSE

A splendid seller. Easy sales, low priced. Big demand. Any one can put it up. Russell sold 90 in 2 days. Gore sold 123 in one week. Vetter sold 72 in less than three days. Mitchell writes: I think I can sell 600 in this town. Don't miss this big chance. Get started at once. Dozen can be carried. Write for free demonstrating sample.

THOMAS MFG. CO., 3248 Gay St., DAYTON OHIO



The Carnes Artificial Arm

has enabled Edward Finnegan, 413 Olive St., Kansas City, Mo., to continue his work as a skilled mechanic, altho he has lost both arms. His earning power is the same, his efficiency practically as high. To see him work or on the street, you would never think that both arms were artificial. This is because the Carnes Artificial Arms which he wears are inconspicuous, natural in appearance, strong and serviceable.

The Carnes Arm is totally unlike any other. It is the only arm that is practical and useful, and at the same time does not proclaim itself as being artificial. Its wearers are able to continue their ordinary occupations, wait on and care for themselves.

Catalog Free We will cheerfully send you our catalog, which fully explains the Carnes Artificial Arm and shows by actual photographs how Salesmen, Mechanics, Farmers, etc., are able to use it in their regular occupations. Write for a copy today.

CARNES ARTIFICIAL LIMB COMPANY
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Make Big Money THIS SUMMER

Here is a good chance, a great opportunity. I have started hundreds of men and women in this high class, profitable business who are now making $25 to $40 a week and more. No experience of any kind is required. I want to show you a way to make big money this summer. Woods made $16 first day. Margaret Emerick made $21 two days. Harris made $9 one hour. Anyone can make money easy, quick, sure—taking orders for "Zanol" Concentrated Soft Drinks and Ciders, for making delicious summer drinks at home. Every popular drink, Orangeade, Lemonade, Cherry, Apple Cider, &c. In concentrated form—small package—makes 80 glasses. Always ready, any time, just add water. Guaranteed under U. S. Pure Food Laws. Big seller for picnics, parties, fairs, ball games, &c. Big line of 250 other fast selling popular household necessities. I furnish complete Outfit and full instructions. Act quick. Write today for exclusive territory and free trial offer. I will show you how to make money.

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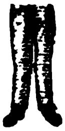
"BOW LEGS and KNOCK-KNEES" UNSIGHTLY

SEND FOR BOOKLET SHOWING PHOTOS OF MEN WITH AND WITHOUT THE PERFECT LEG FORMS

PERFECT SALES CO.
140 N. Mayfield Ave., Dept. S, Chicago, Ill.



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ON CREDIT

Send No Money Any Diamond shipped for inspection, charges prepaid. Examine carefully — if satisfied pay 1/5 and keep it — balance 10% monthly. If unsatisfactory, return, our expense. DON'T PAY A CENT unless you're sure Lyon Diamonds are SUPERIOR VALUE. Every Diamond guaranteed. Exchangeable at YEARLY INCREASE in VALUE of 8%. Send TODAY for FREE Catalog No. 3A. 10% Discount on all Cash Purchases.

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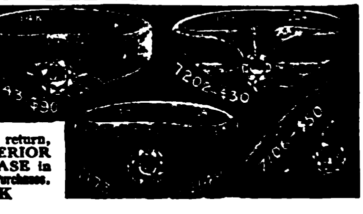

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Ask Your Druggist for A-K Tablets
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Small Size 10c — AK Fac-Simile — **Dozen Size 25c**

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Learn to be **an expert wrestler.** Know scientific wrestling, self-defense, and jui-jitsu. Develop a splendid physique, and have perfect health. Join this popular school and **learn by mail.** The famous world's champions—the marvelous

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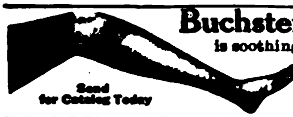
offer you a **wonderful opportunity.** Wrestling is easily and quickly learned at home **by mail.** Men and boys write **now** for **splendid free book.** Learn all the science and tricks. Be able to handle big men with ease. Accept this wonderful offer NOW. Send for **free book today,** stating your age.

Farmer Burns School of Wrestling, A919 Ramge Bldg., Omaha, Neb.

Buchstein's Fibre Limb



is soothing to your stump—strong, cool, neat, light. Easy payments. Braces for all deformities.

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To Prove Our Fine Quality we offer these fine pants for dress or business, many handsome styles, genuine through and through worsted goods, beautiful narrow weave, smooth silky finish, guaranteed for 2 years solid wear and satisfaction and regular $5.00 value or MONEY BACK. These stylish $5.00 pants, while they last, only one pair to any customer, by prepaid express, for only **$1.85**

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VIOLET RAYS for Health Strength and Beauty

You can now *give yourself* the wonderful Violet Ray Treatment — recognized by science as a most effective health-restoring agent. Heretofore the benefits of the famous Violet Ray were only procurable at big expense from physicians or specialists. It is now simplified and made perfectly safe for self-treatment. See list of treatments on coupon below. Send for full particulars.

Sold On Liberal Trial Plan

Painless Electricity Science has modified electricity that the weakest may stand the force without fear or pain. The Violet Ray High Frequency has no comparison with the old, crude electrical batteries and shocking current. Every jar and shock is removed. The effects are marvelously rapid. Relief can be given in one or more treatments. Often permanent improvements accomplished in that time. To keep or restore your good looks and gain vitality throw away medicine bottles — take this sensible scientific means. Every day's delay makes relief more difficult. **Send for Booklet, "Health via Violet Ray."**

Renulife VIOLET RAY High Frequency Generators

How Violet Ray Benefits Electricity from your light socket is transformed into health and beauty-giving Violet Ray—powerfully effective, yet gentle, soothing, perfectly safe. Voltage is raised from lighting current, giving tremendous penetrative force. The irresistible, re-vitalizing powers of Renulife Violet Ray are carried at once to every nerve cell of the body. Blood is enriched and purified by a flood of oxygen, functions restored to normal—extra supply of fresh blood quickly brought to area treated, removing congestion and supplying nourishment; combines the benefits of electricity, vibration, exercise, stimulation and oxidation.

Get Book Sent Free

Get the whole marvelous story of the Violet Ray—its uses, prices, etc.

Wanted — Live Representatives

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Canadian Renulife Electric Co.
252 Netting Bldg.,
Windsor, Ontario

COUPON FOR BOOK and Special Information

RENULIFE ELECTRIC CO.,
652 Marquette Bldg., Detroit

Please send without obligation, your book "Health," explaining Violet Ray treatments with Renulife Generators; also give full particulars as to its application for ailments checked below.

TREATS SUCCESSFULLY

- Abscesses
- Anemia
- Asthma
- Arteriosclerosis
- Baldness
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- Brain Fag
- Bronchitis
- Bunions
- Bruises
- Catarrh
- Colds
- Chilblains
- Dandruff
- Deafness and Ear Diseases
- Eczema
- Enlarged Prostate
- Facial Neuralgia
- Falling Hair
- Female Complaints
- Goitre
- Gout
- Haemorrhoids
- Hay Fever
- Infantile Paralysis
- Insomnia
- Lameness
- Locomotor Ataxia
- Lumbago
- Nervous Affections
- Neuralgia
- Neuritis
- Obesity
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- Pimples
- Pyorrhea
- Rheumatism
- Scars
- Sciatica
- Skin Diseases
- Sore Throat and Throat Diseases
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- Toothache
- Weak Eyes
- Wrinkles
- Warts and Moles

Name...

Address...

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16-Battery
Charging
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CHARGING AUTO BATTERIES

Will Pay $150 to $250 *Clear Profit* Every Month

All you need is HB Equipment. The business is waiting for you—**right now.** More cars are being driven than ever before, with batteries to recharge, and all new Fords are equipped with storage battery. Start **NOW** to get these big, steady profits.

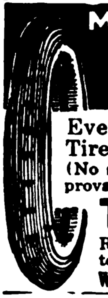
This H-B 16-Battery Charger Can Be the Biggest Money-Maker in Your Garage

Recharges 1 to 16 6-volt batteries or equivalent in 12- or 24-volt batteries at once. Current cost 12 to 15c each. Owner pays 75c to $1.50. Figure those profits. Compare them with other branches of your business! HB Chargers last for years—sturdy, economical, dependable. Finest materials and construction. Long service with *quick, clean, permanent profits.*

$57 Puts This Money-Maker in Your Garage on Money-Back Guarantee

Balance in 10 monthly payments of $23 each. Earnings pay for machine. No electrical knowledge necessary to install or operate. Uses 2 or 3 phase city current. Furnished complete with 2 charging panels capable of charging 1 to 8 batteries each. No burn-outs or expensive renewals. Nothing to wear out or break. Sold on HB Absolute Money-Back Guarantee. Order now—you run no risk. Pin your $57 check to this ad and mail today for trial order.

Hobart Brothers Company, Box M6, Troy, Ohio
Successful Manufacturers Since 1893



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Everywhere to sell High-Grade 5800-Mile Tires direct from factory. New stock. (No seconds.) All sizes. Delivered FREE on approval. ACT AS AGENT—GET YOUR OWN

TIRES FOR 1/4 LESS

Represent us in your locality. Be quick—write today—give size of tires.

Walter David Rubber Company, 208 Sweeney Bldg., Kansas City, Mo.

1919 Columbia Bicycles

Send for Catalog

Westfield Mfg. Co.
Dept. 15, WESTFIELD, MASS.

Short One Point—and the Other Keeps on Firing!

Ordinary troubles don't stop the Twin Fire plug because it has two distinct sparks—each operating entirely independent of the other, just as if you had two separate plugs in each cylinder.

TWIN FIRE

Means Two Distinct Sparks!

If you short one point by means of an ordinary lead pencil (see illustration) the other goes right ahead firing and the hot explosions soon clean the first one—putting it back in working order again.

Ask your dealer to see the famous "Lead Pencil" Test.

Ordinary plug dead when even one point clogs.

Twin Fire always fires. Clog one gap and the other still fires. One point cleans the other.

Dealers

The Twin Fire is the only plug with two independent sparks—and with the Twin Fire Demonstration Outfit sales come easily and fast. Get details on dealer plan at once

Twin Fire Spark Plug Co.
724 Grand River Ave., Detroit, Mich.

Auto Heel Rests

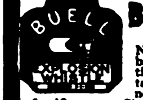
MADE IN 4 SIZES

½" 1" 1½" 2"

of Frosted Aluminum

Sold by all Dealers, or will be sent postpaid 75c. Made only by

J. L. LUCAS & SON, Inc.
Bridgeport, Conn.



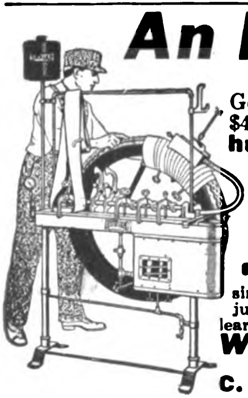
BUELL EXPLOSION WHISTLE

Now used by over 40 Automobile Mfrs. as standard or optional equipment. Quickly attached, simple to operate, never needs adjustment. Guaranteed for 10 years. Single tone $4.25. Chime $6.00.

SEND FOR CIRCULARS

Buell Manufacturing Co., 2953-85 Cottage Grove Ave., Chicago

An Easy Way to Make Money



Don't be content to plod along on a small salary. Be independent. Go in the tire repairing business and make $60 or more a week. One man made $45 the first day he received his outfit. **Others are making $25 a day and hundreds of wide-awake men are making $200 to $500 a month.** No experience needed. We teach you how. Very little capital required. But slight risk, as every car owner in your town is a possible customer. Jobs are plentiful because tires blow out and puncture every day.

SHALER Tire Repair Outfit, $70

will do as much and as perfect work as the big $250 to $600 vulcanizing outfits. A boy can vulcanize perfectly with this simple machine. It's the only vulcanizer that has **Automatic Heat Control.** It must vulcanize just right. It can't undercure or overcure a tire. Requires no watching or regulating. You can learn to do expert tire vulcanizing in half an hour with the Shaler.

WRITE FOR FREE BOOK "HOW TO OPEN A TIRE REPAIR SHOP" and complete Catalog, which gives full information.

WRITE QUICK BEFORE SOME HUSTLER GETS AHEAD OF YOU.

C. A. SHALER CO., 2005 Fourth Street, WAUPUN, WIS.

LOCKTITE
Auto-New-Matic Patcher
ANY SIZE REPAIR MADE EASY
MADE BY LOCKTITE PATCH CO.
$1.25

At your Dealers or Postpaid

Locks the Patch to the Tube

BECAUSE it seals a rip or hole in a tube absolutely tight—in a jiffy—with no waiting for the patch to set—

Because it is a complete tube repairing patcher—with cylinder and clamp for holding tube in place—with emery—with strong, Locktite, canvas-back patchingsheet—gasoline swab—tube buffer and cement—

That's why the Locktite Auto-New-Matic Patcher is in great demand by all motorists.

Blowouts or punctures—any size repair is made easy with the Locktite.

HOW IT WORKS

First place the tube around the container—as shown in the picture. Clean and roughen the surface around the hole with emery, apply cement. Then press on the patch firmly—and the tube is ready to go into casing. No waiting for the patch to set.

Save time and money by securing a Locktite Patcher at once. Then you will be ready for any emergency on the road—and can repair your spare tubes in your own garage. Be ready, for tire trouble is bound to occur.

Send money direct if your dealer is unable to supply you with the Locktite. The price for this new Locktite Auto-New-Matic Patcher is $1.25. If you order by mail we will pay the postage. It is sold on a money-back guarantee.

LOCKTITE PATCH COMPANY, DETROIT, MICH.
1027 BELLEVUE AVE.
Canadian Plant: **Windsor, Ontario**

LOCKTITE
AUTO-NEW-MATIC PATCHER

The Anderson Steam Vulcanizers

WE MANUFACTURE THEM

We Own and Teach You the Anderson Method of Vulcanizing

90% Profit And still you guarantee your work to outlast balance of the tire and collect full customary prices. Ask us for literature and location of nearest Anderson State School. We urge you visit that city where you can see all other makes and learn their method, then visit the Anderson School there and learn our Method. Go prepared to take 5 to 10 days' course of the ANDERSON METHOD. We guarantee to make a first class vulcanizer out of you or refund your money. Our course will cost you $20 in either the day or night classes and any time thereafter you buy and pay us for a vulcanizer, your $20 will be refunded in cash. $235 and 5 to 10 days in any Anderson State School of Vulcanizing will start you in this most profitable business.

The ANDERSON STEAM VULCANIZER CO.
2 Williams Bldg., INDIANAPOLIS, INDIANA, U. S. A.

Please print your name. We receive many we cannot make out.

THE CORBIN DUPLEX COASTER BRAKE
is the standard brake equipment, assuring absolute control. Equip it now. Send for 1919 catalog.
THE CORBIN SCREW CORP. The American Hardware Corporation, Successor
NEW BRITAIN, CONN. BRANCHES, New York, Chicago, Philadelphia

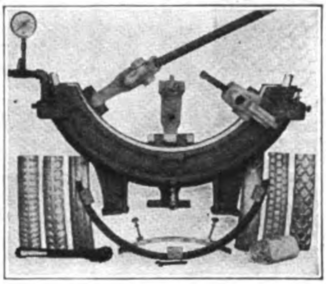
SAVE ON TIRES

Any Tire You Want at Wholesale Cost. No Seconds or Off-Brands — All Guaranteed New Stock. We Pay the War Tax.

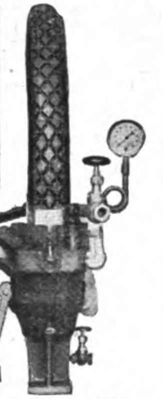
Buy direct from one of largest tire jobbers in America—we have no agents, salesmen, no hotel, traveling or salary expenses. You get the saving. No matter what tire you want (Goodyear, Goodrich, Firestone, Capitol, etc., guaranteed up to 6000 miles), we can save you money. We legally guarantee every tire. Write today for prices.

A. H. Jennings & Sons, 1614 N. 7th St., Kansas City, Kans.

Anti-Skid Retreading at Enormous Profits and Small Investment



Free Instruction in Tire Repairing at our Plant.



Dry Cure Retreading

is the most PROFITABLE and INTERESTING occupation of the entire automobile industry and we have so simplified the process with our latest machines that the average person can produce perfect non-skid tires with less than a week's instruction.

Write today and let us tell you about this greatest mechanical achievement in the history of vulcanizing equipment. A tire retreading machine which not only forms and cures plain and ribbed treads, but will produce beautiful designs in various anti-skid patterns.

We also manufacture Steam Generators, Section Molds, Tube Plates and General Tire Shop Equipment. Get our Catalogue and Prices before Buying.

WESTERN TIRE & RUBBER WORKS
315-323 No. Crawford Ave., Chicago, Ill.

Stoll Auto Bed and Water Proof Tent

Comfortable-Convenient-Compact

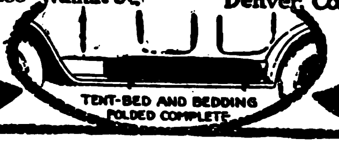
Goodbye to stuffy rooms at hold-up rates. Stop when and where you please, yet sleep as comfortably as at home, with a Stoll Auto Bed. It folds up on the running board into a bundle 6½ x 8 x 47 inches, with bedding complete. Does not block doors. Nothing to crowd tonneau.

Camp Comfort Supreme

Simple, compact, practical and mechanically perfect. Includes Spring-Mattress-Bed large enough for two—tent of army shelter-duck, ventilated with screen windows. Lasts for years. Quickly pays for itself in hotel bills saved. Write for illustrated booklet and prices.

Established Dealers: *Write for our unusually attractive proposition.*

The Stoll Mfg. Co.
3233 Walnut St. Denver, Colo.


TENT-BED AND BEDDING FOLDED COMPLETE

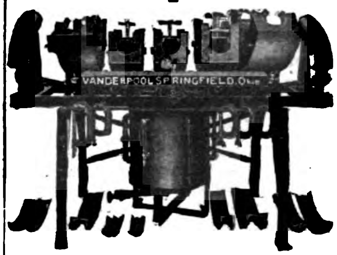
The Opportunity is Tremendous

Hundreds of thousands of new automobiles being sold every year.

Open a Tire Repairing Shop

Most profitable business on earth requiring such small investment. In a short time you build up an enormous business.

Vanderpool Vulcanizer



repairs tires exactly as made at the factory. Capacity of $100 worth of work a day. Vanderpool Vulcanizer has improved features not possessed by any other. Write at once for Free Tire Repairing Manual and full particulars.

In answering address Dept. B9.

WILLIAM VANDERPOOL CO.
SPRINGFIELD, OHIO

Roofing Book FREE

Get Our Freight Paid Roofing Prices

Don't buy Roofing of any kind until you get our big Free Roofing Book, describing full line of Edwards Famous "Tightcote" Galvanized Roofings, Sidings and Ceilings, and our lowest freight-paid prices. Then see for yourself how much we save you by selling direct and saving you all in-between dealers' profits.

EDWARDS "REO" Metal Shingles

Absolutely rust proof. By our patented "Tightcote" process, edges as well as sides of metal sheets are heavily coated with zinc—not a space the size of a pin point exposed to weather. Fire and lightning proof. Outlasts three ordinary roofs. Forever wind and weather proof. Need no repairs—end all roofing expense. Patent **INTERLOCKING DEVICE** makes water tight seams—all nail heads covered—no chance for rust or leaks.

EDWARDS Galvanizing Test

Edwards "Tightcote" Galvanized Roofing can be bent, twisted or struck by lightning, and the galvanizing will not crack or flake. Bend it or hammer it—you can't loosen or scale the galvanizing. No other galvanized roofing can withstand this test.

Low Priced Garages

Wide variety of styles, all sizes of Portable Fireproof Metal Garages. Lowest prices ever made. Postal brings Big Garage Catalog **free.**

Write Today for free samples and proof that we can save you a lot of money on any kind of roofing siding or ceiling you may need. Ask for Roofing Book No. 650.

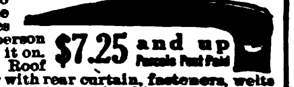
THE EDWARDS MFG. CO.,
600 - 650 Pike St., Cincinnati, O.

The Liberty Plane Radiator Ornament

The most popular Radiator Ornament ever produced. Fits any car, indestructible, solid aluminum, highly polished, wings hand-painted with flying emblem in Red, White and Blue. The slightest motion spins Propeller arm, and makes it seem alive. "It fairly hums with Patriotism." Postpaid $1.00; get the Agency.

DEFENDER AUTO LOCK COMPANY
500 Marquette Bldg. Detroit, Michigan

You Can Save $50.00



By recovering your old auto top frame yourself. We make these recovers to fit all makes and models of cars. Any person that can drive a car can put it on. We furnish instructions. Roof and quarters sewed together with rear curtain, fasteners, welts and tacks. All complete. Give us the name, year and model number of your car and we will send you our catalogue with samples and quote you exact price.

$7.25 and up Parcels Post Paid

LIBERTY TOP & TIRE CO., Dept. E7, Cincinnati, O.

GREB RIM TOOL

Operates all types of cross-split rims

"Wallop" your rim with a hammer to force it in or out of place and you are bound to have greater trouble next time. **DO THE SENSIBLE THING:** Provide yourself with the best rim tool on the market and save time, trouble and rims.

Ten Days' Trial If your dealer or jobber does not have them, we will send you one. Try it ten days. If not satisfactory, return it to us and we will refund your money. **We also make the Greb Automatic Grip Puller.**

THE GREB CO., 193 State St., BOSTON

Tire Agent

We want one exclusive representative in each locality to use and sell the new Mellinger Extra-Ply, hand made tires. **Guarantee Bond for 6000 Miles.** (No seconds.) Shipped prepaid on approval. Sample sections furnished. Do not buy until you get our Special Factory Prices. Write

MELLINGER TIRE & RUBBER CO., 946 Oak St., Kansas City, Mo.

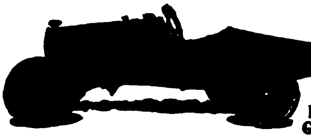
THE more you associate with a new Stromberg Carburetor the firmer your confidence in its efficiency. Anywhere — in any weather — with any car the New Stromberg guarantees a quick start—then development of power that *gets* you there. And *this* at the greatest of mileage economy.

The utmost of engine energy at least of travel expense and trouble. Write for descriptive matter. State name, year and model of your machine.

STROMBERG MOTOR DEVICES CO.
Dept. 614 64 East 25th Street Chicago, Ill.

New STROMBERG Does it!
CARBURETOR

Build Your Ford into a Classy Speedster with the Red-I-Kut Life-Sized Patterns



Your own tools and spare minutes are all that's needed.

3 types
$3.50
$5.00
$6.00
Send stamp for catalogue to
KUEMPEL CO.
Guttenberg, Ia.

They Just CAN'T Miss!

Price $1.25 Each. 30 DAY OFFER 4 For $3.00

PRIMO Transformers

increase the spark immensely. Make starting easy Explode all the vapor. More Power — Less Fuel. Will last 2 years. Money-back guarantee.

THEY JUST *CAN'T* MISS!

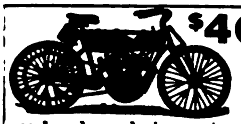
WESTERN IGNITION CO.
Dept. F, 618 Frisco Bldg. ST. LOUIS, MO.

35 Miles per hour

Is Record of this Car

Boys, Build This Car. This nifty little car driven by gasoline motor, can be built by any boy. Parts are furnished by us and are very cheap. Send 26c for building plans & price list of parts showing how to build this lad's car.

SYPHER MFG. CO.
146 Warren Street
TOLEDO, OHIO

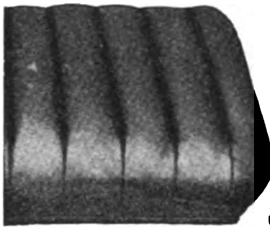


$40 Motorcycle

We have the largest line of new and used motorcycles in the country at the lowest prices. Every machine guaranteed. Send for catalog. We are the largest and only exclusive motorcycle supply house in the world. Repairs a Specialty. Send us your machine to be overhauled. Motors and castings for airships and railway velocipedes. WE EXCHANGE MOTORCYCLES.

HARRY R. GEER CO., 888 McLaran Ave., St. Louis, Mo.

INSYDE TYRES Inner Armor for Auto Tires. Double mileage, prevent blow-outs and punctures. Easily applied in any tire. Thousands sold. Details free. Agents wanted. **Amer. Accessories Co., Dept. PD Cincinnati**



CUSHION COMFORT
FOR ALL CARS

From a Ford to a Pierce Arrow. None So Good or Bad We Can't Improve.

Write for Full Particulars and Price.

American Cushion & Spring Co.
Factory 8 KALAMAZOO, MICH.

$1 a Week pays for the Black Beauty

Send No Money
Shipped on Approval Freight Prepaid

Don't buy an ordinary bicycle. Get the **Black Beauty**—*factory direct; wholesale price.* Magnificent wheel Strongest, raciest in all cycledom. *Five-year guarantee.*

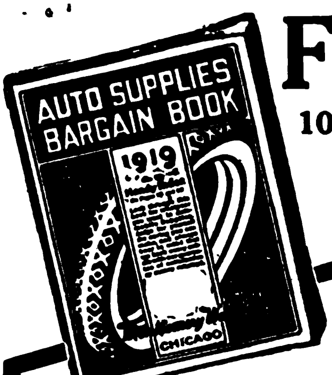
18 Exclusive Features

See the wheel before paying a cent. Get our Catalog; select your model. *20 Styles.* We ship at our own risk. Keep or return. No waiting to save up money. *Months* to pay — small amount on acceptance, then $1 a week.

Sundries Get our factory prices first. Lowest in the country. Tires, lamps, horns, etc. Everything for cyclists. Free Sundries Catalog.

Haverford Cycle Co. Dept. F 63 PHILADELPHIA

FREE Beautiful New Catalog in colors



FREE

100-Page Book

Low Prices

Auto Owners:

Get This Big New Book

Sit in an easy chair at home and buy auto supplies from this Guide to Low Prices. Over 2000 selections to choose from. It shows supplies that will improve all cars—and make them worth more—gas savers, spark plugs, batteries, spot-light, painting outfits, touring outfits, etc.

Reduced Prices on Riverside 5000-Mile Auto Tires

Riverside Tires are now priced the lowest they have been in months. This new FREE book tells all about them—the prices prove Riverside Tires give you "Most for the Money." Write now for your FREE copy of this book. Address the house nearest you.

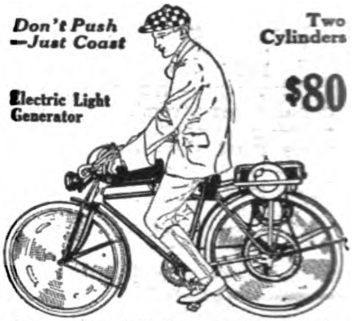
Dept. C133 **Montgomery Ward & Co.**
Satisfaction Guaranteed or Your Money Back
Chicago Kansas City Fort Worth Portland, Ore.

Coast Up Hill

The **Johnson Motor Wheel** makes any bicycle into a ***two*** cylinder motorcycle—strong enough for any man, light enough for women and children. Travels 6 to 35 miles an hour. 150 miles on a gallon of gasoline. Magneto and electric light generator.

No special clothing required for riding any more than for a bicycle. Same guarantee as for the most expensive motorcycle.

Write for catalog and name of nearest dealer.



Johnson Motor Wheel on an ordinary bicycle

JOHNSON MOTOR WHEEL CO.
209 S. LA SALLE ST., CHICAGO, ILL.

EMO TRANSFORMERS

Will Increase Power—Add Fuel Mileage—For Automobiles, Aeroplanes, Trucks, Tractors, Motorcycles, Marine and Stationary Engines

EMO TRANSFORMERS transform the ordinary slow, faint spark into a high-tension blue blaze or flame which instantly explodes all the vapors even in the lowest gravity fuel, thereby insuring greatly added power and mileage. This intensive blue-white EMO flash keeps the spark plug points free from carbon, soot and oil. Prevents "bucking" or "loping." Insures easy starting, quicker acceleration, and a [illegible] uniform flow of power at all speeds. Protects the entire [illegible] system. Save many times their cost in fuel and spark plug economy. One EMO on each plug makes all cylinders pull even. Can be attached by anyone.

$1.00 Each at Dealers, or sent prepaid upon receipt of price. State make of car when ordering.

The Emo Laboratories 2256 North Illinois St.
INDIANAPOLIS, IND.

DENINGER WILL SAVE YOU 25 TO 50 DOLLARS

BIG MONEY SAVINGS FOR YOU

$40

Used and rebuilt motorcycles, single and twins, $25 to $100. - Used bicycles, $5.00; tandems, $10. All machines guaranteed in good working order. New bicycles and motorcycles at Factory prices. You save dealers' profits. Motorcycle and automobile tires too, $3.00. Complete line of parts and supplies.

Send for catalog

Deninger Cycle Co., Rochester, N.Y.

BUILD THIS CAR OR BUY IT COMPLETE

Lowest Priced Car in the World!

Very fast. Economical. Seats two full-grown persons. Not a toy. Complete Detailed Drawings, 35c. Catalog 10c. Cycle Car and Light Car parts at low prices. Discount to Agents.

Tribune Engineering Co., Dept. P. Owego, Tioga Co., N. Y.

The Cleveland

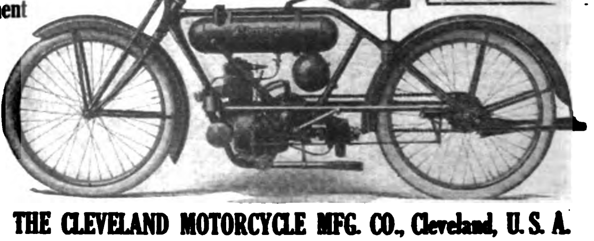
75 MILES to the gallon

The only lightweight motorcycle adopted by The United States War Department

Two Stroke Motor
Unit Power Plant
Worm Drive Transmission
Standard for four years

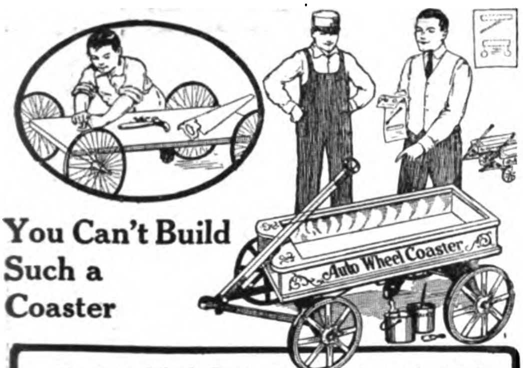
Write for catalog and agency. (One dealer sold six carloads last summer.)

$225 Plus War Tax



THE CLEVELAND MOTORCYCLE MFG. CO., Cleveland, U. S. A.

BLENDING light weight with low cost, the CLEVELAND still has no rival among motorcycles. It stands alone in its scientific combination of light weight and power. The 1919 CLEVELAND is retaining the same principles of original design that have made it successful for four years—but this year's model is a finer machine than ever before—in appearance, comfort and service.



You Can't Build Such a Coaster

The Auto-Wheel Coaster is designed and built by men who know boys' tastes, and have the materials to build with. For years a favorite because of its strength, speed and grace.

The Auto-Wheel Convertible Roadster below is a double purpose wagon, changed in a minute from roadster to speedster. Both types have the durable oval spokes, roller-bearings, and steel axles.

Free Felt Pennant and Color Catalog for names of 3 coaster wagon dealers. (Tell which handles the Auto-Wheel).

Caps Free to Auto-Wheel Coaster Club members. Special cap to captain. Organize your Club now, and write for details.

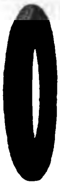
THE BUFFALO SLED COMPANY
137 Schenck Street N. Tonawanda, N. Y.
In Canada: Preston, Ont.

KENNEBEC CANOES

The "tumble home" of the Kennebec makes this canoe absolutely safe for man, woman and child. Our 1919 catalog, sent free for the asking, tells why.

KENNEBEC

Kennebec Boat & Canoe Co.
89 R. R. Square, Waterville, Maine



KIMBALL CORD TYPE TIRES

GUARANTEED 3500 MILES

NOTE OUR PRICES

SIZE	TIRES	TUBES
30 x 3	$11.00	$2.50
30 x 3½	13.25	2.60
32 x 3½	15.25	2.70
31 x 4	18.25	2.60
33 x 4	21.50	3.50
34 x 4	22.50	3.60

Other sizes in proportion. *Terms:* $1 deposit with each tire ordered, balance C. O. D. subject to inspection.

KIMBALL TIRE & RUBBER CO., INC.
2204-PM Michigan Ave. CHICAGO, ILL.

DUNN COUNTERBALANCES for Ford Crankshafts

are the greatest accessory yet produced. Attached by removing plate on bottom of crankcase. Not necessary to remove shaft from motor. Fifteen high-priced cars now use counterbalanced crankshafts. Dunn Counterbalances produce the same results in a Ford. No machine work necessary. Installed in an hour. Over ten thousand in use, and every user satisfied. Try a set ten days and if they do not do all we claim return them and money will be refunded. Guaranteed to save 20% gasoline, reduce vibration to a minimum, relieve bearing pressures and add 100% to the life of the motor. All Ford racers are being equipped with them. They put the Ford motor on par with Multi-cylinder and super-motors. Price $12.00 per set. Cash or C. O. D. or write for full information.

DUNN COUNTERBALANCE CO., Box P, Clarinda, Iowa

Thrifty?-yes!

LONG-LIFE Kokomo BICYCLE TIRES

THE longer your tires last the less they have cost you. Kokomos have more rubber, have a leak-proof valve liner made from one piece of cured rubber, and an inner lining that never "slow-leaks"—only new, live rubber is used and it can't leak.

The studded tread prevents costly accidents and enables you to speed on slippery pavement.

Kokomos cost less per mile of tire.

Your dealer has five models at low prices. Put on your pair of Kokomos today.

Kokomo Rubber Company
Kokomo, Indiana

TIRES QUALITY AND ECONOMY FOR MOTORISTS

Slightly used and factory repaired tires and new tubes of the best known standard makes that mean big cash savings for every car owner. No junk is included in this stock.

Size	Tires	New Tubes
30x3	$5.00	$1.70
30x3½	6.00	2.10
32x3½	6.50	2.25
31x4	7.25	2.50
32x4	8.00	2.60
33x4	8.75	2.70
34x4	8.75	2.80
35x4	9.00	2.90

Size	Tires	New Tubes
36x4	$ 9.00	$3.00
34x4½	9.25	3.15
35x4½	9.50	3.25
36x4½	9.75	3.30
37x4½	10.25	3.50
35x5	10.50	3.65
36x5	10.50	3.65
37x5	11.00	3.75

Special Proposition to Live Dealers

For Non-Skids add 10 per cent to Above Prices

Complete Stock of New Tires

Write for Prices Terms: $1.00 deposit with each tire ordered, balance C. O. D. subject to inspection. Specify style of rim to avoid delay. Although at the above prices these tires bear no mileage guarantee we will make reasonable adjustments should they prove unsatisfactory. All tires sent in for adjustment must be prepaid.

TIRE REPAIR & SUPPLY COMPANY
DEPT. P, 1429 MICHIGAN AV.
CHICAGO

TUBES

HB 500 Watt Battery Charging Set

RIGHT NOW You Can Make Big Profits in

BATTERY CHARGING

Owners of HB Chargers everywhere are making $100 to $400 *Clear Profit* every month, depending upon size of HB Charger they have. Business better than ever—no end in sight. **YOU** can do as well. Don't delay—this business is at your door. Get out and get it with sturdy, dependable HB Equipment.

This HB 500 Watt Charger Will Pay $100 to $200 Clear Profit Each Month

No electrical knowledge required to install or operate. Recharges 7 6-volt batteries at once. Costs 12c to 15c each to recharge, customer pays 75c to $1.50. Big, quick, clean profits—easily made. No burn-outs or expensive renewals. Steady service 24 hours a day. Economical to run, requires no attention save occasional oiling.

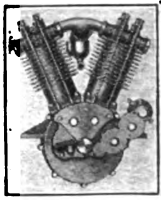
$25 Puts This Money-Maker in Your Garage on Money-Back Guarantee

Balance in 9 monthly payments of $20 each. Earnings easily pay for machine. Pin $25 initial payment payment check to this ad and send *today* for trial order. Sold under HB Absolute Money-Back Guarantee. Order **NOW**. Don't delay. Get busy! Get those profits!

Hobart Brothers Company, Box 116, Troy, Ohio
Successful Manufacturers Since 1893

No Punctures **Essenkay** A TIRE FILLER **No Blowouts**

Write for Confidential Free Trial Introductory Offer on ESSENKAY for passenger car or truck tires. OVER 50,000 SATISFIED USERS!
ESSENKAY PRODUCTS CO., 68-220 W. Superior, Chicago



12 to 15 H.P. Motor, $55

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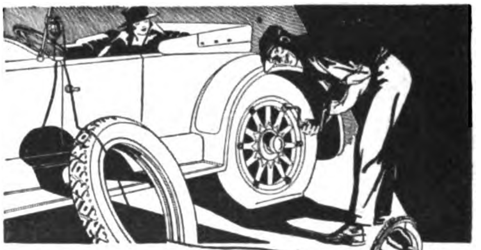

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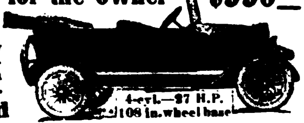

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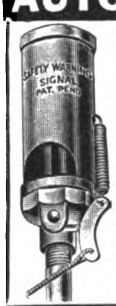
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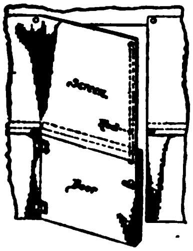

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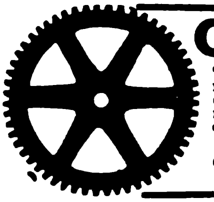

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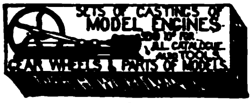

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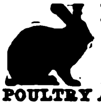

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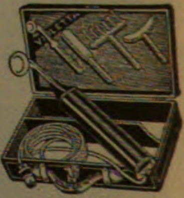

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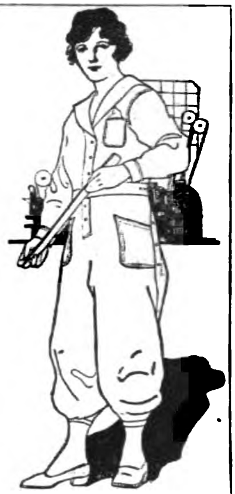

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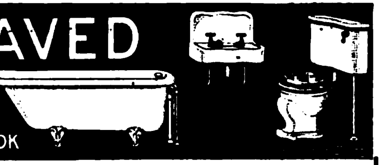

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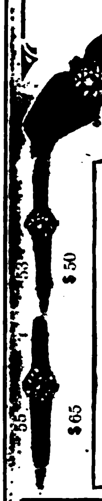

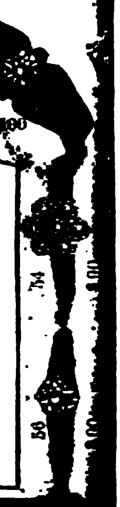

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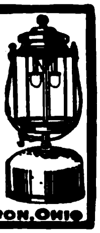

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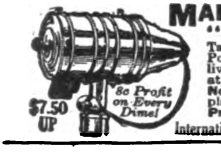
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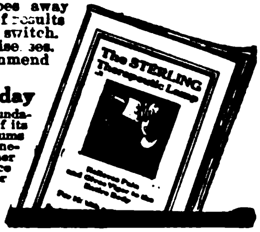

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Years ago we had to take "turns" at the barber shop for shaves and hair cuts. Today men shave themselves and cut their hair at home. It's part of the regular toilet to trim the hair a little every few days. It is easy to keep the hair trim and neat all the time with the

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Anyone can use it. Gives you a perfect hair cut in your own home. Keeps you always looking as well as when you stepped out of the barber's chair. Cuts your hair just as you want it. The Cowan is scientifically correct. Adjustable for trimming around ears and neck. Used as a safety razor also. A high-grade, carefully made article. Comes packed in attractive, convenient metal case. Lasts a lifetime.

10,000 in Use Over 10,000 satisfied users. The real proof is to write today for our special trial offer. Prove it to yourself. Why wait? You'll be cutting your own hair before long anyway—everybody will.

Mothers A Cowan will keep the boy's hair trim and neat all the time. Get one now and do away with those tiresome trips to the barber shop.

FREE! Send today for trial offer and folder that tells all about the Cowan and how you can try it at our risk.

COWAN HAIR CUTTER CO.
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3 FINE MADRAS SHIRTS $3.85 Postpaid
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Our shirts have features of quality not always found in shirts at higher prices—such as, beaded neck bands, full body measurements, stripes carefully matched and buttons of extra fine quality pearl. **WRITE TO-DAY.**

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Jingle Contest

If you can write a jingle,
--One that sets the blood a tingle,
To sail the waters blue, with pleasant skies--
Come now, married folks and single,
With the winning jinglers mingle,
And wear a brooch of gold--for that's the prize.

Five gold "Sea Goddess" Brooches, jewel-set for women, will be awarded the best jinglers. The twenty-five next best efforts will be rewarded with brooches of lesser value.

Jingle Contest Closes July 1
Mail to "Jingle Editor"

Detroit and Cleveland
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BRAND NEW TIRES and TUBES

at exceptionally low prices. To appreciate these wonderful values send us a trial order.

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30 x 3½	11.75	2.45	33 x 4½	25.75	3.75
32 x 3½	13.80	2.65	34 x 4½	26.60	3.80
34 x 3½	16.15	2.75	35 x 4½	27.85	4.00
31 x 4	18.00	2.75	36 x 4½	28.25	4.50
32 x 4	18.50	2.80	37 x 4½	32.35	4.50
33 x 4	19.30	3.35	35 x 5	31.75	4.50
34 x 4	19.75	3.50	36 x 5	35.85	4.50
35 x 4	22.50	3.50	37 x 5	33.55	4.50

10% more for non-skid.

Terms One Dollar deposit with each tire ordered. Balance C. O. D. with privilege of examination. 2% cash discount when remittance in full accompanies order. Tires may be returned for full credit if not satisfactory upon examination. Although above tires bear no mileage guarantee, we will cheerfully make reasonable adjustment should they prove unsatisfactory. Tires for adjustment must be sent in by prepaid express

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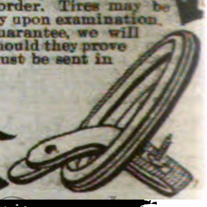

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Ro-San Washstand Hot and Cold Running Water without Plumbing.

Rolling Bath Tub, With Heater A Wonderful proposition—just out—everybody eager for it.

These four specialties will make any hustler **big money.** You can fit out any home with a complete bathroom. We want live wires everywhere to represent us, either part or all of their time. Special proposition to men who can direct men and organize territory and who can carry small stock.

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When You're Lonely, (Won't You Come Back To Me)
Clovertime—The Busted Blues—Happy Days

Get them from any music counter or sent direct from publishers for 12c each. All five for 55c postpaid. **WONDERLOVE**, a semi-high class waltz serenade 30c. **SAY NUFFIN**—a pianolog 30c. Both 30c songs and five popular songs as above for $1 postpaid. If you want them for your Phonograph or Piano Player ask any dealer.

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GILBERT'S New Wheel Toy

Makes This Fine Coaster and Other Great Toys

You can make lots of other fine things too, easy as rolling off a log—a sporty wagon, a dandy geared racer, a glider that is better than the regular ones, a big wheelbarrow, a baggage truck—something new every week.

These toys are not models or flimsy affairs but are exceptionally strong and sturdy. With a screw driver and a wrench and the things in the outfit any boy can make the glider, wagon, coaster, etc., in no time at all.

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name for Gilbert's new toy
My name is.......................
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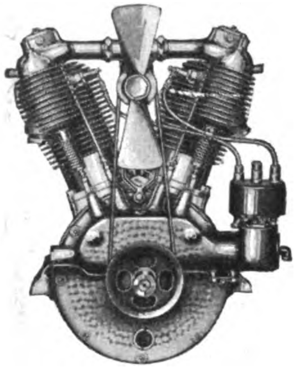
SPACKE 9-13 DE-LUXE MOTORS



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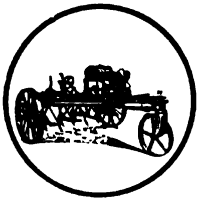
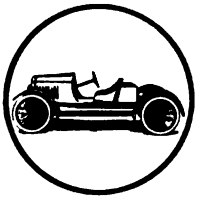
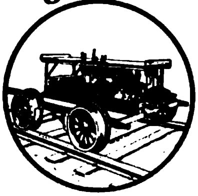
Tractors



Cultivators



Light Cars



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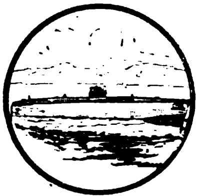

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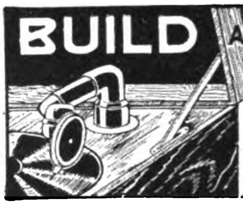

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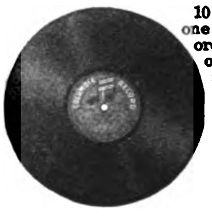

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Oh! Oh! Oh! He's Breaking My Heart..Marguerite Farrell, Soprano
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2417—Sweet Child—One-Step...........Dixie Jazz Orchestra
Old Town Pump—Fox-Trot......Dixie Jazz Orchestra
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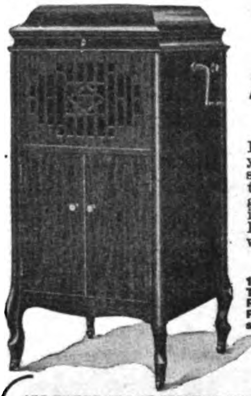

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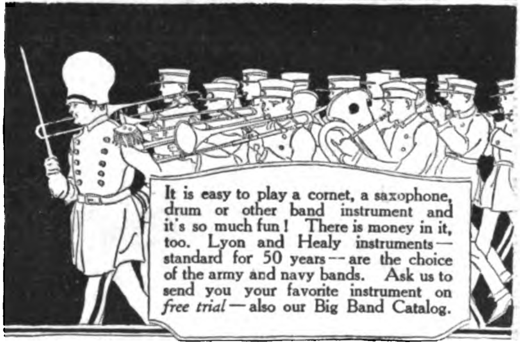

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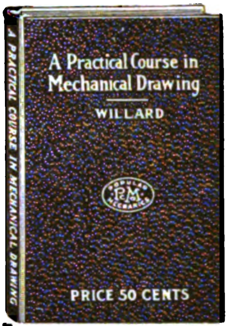
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32 x 3½	6.50	1.50	36 x 4	9.00	1.75	37 x 4½	10.25	1.90
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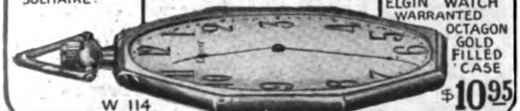

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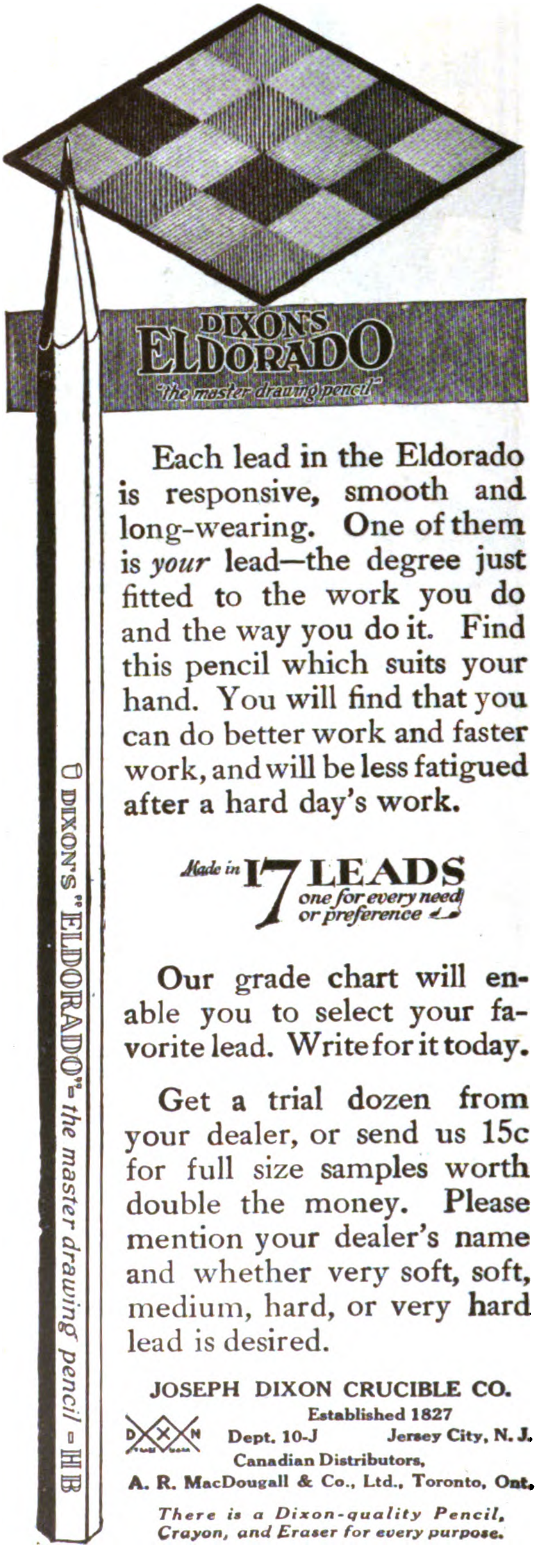
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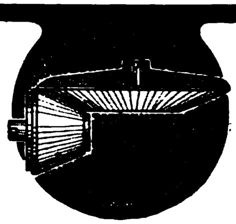

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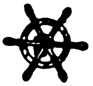

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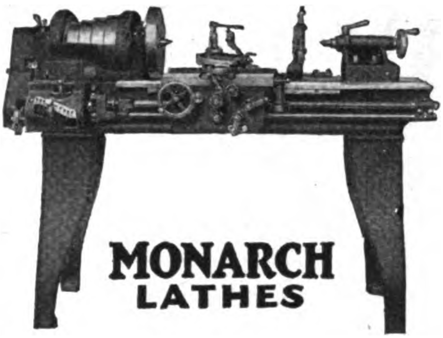

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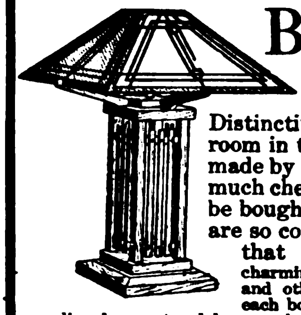

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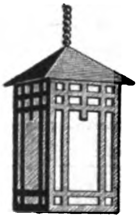

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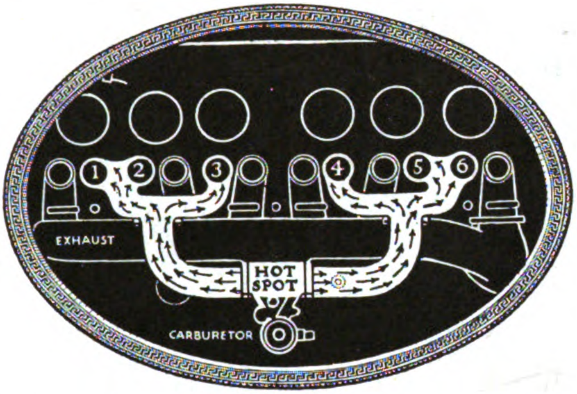

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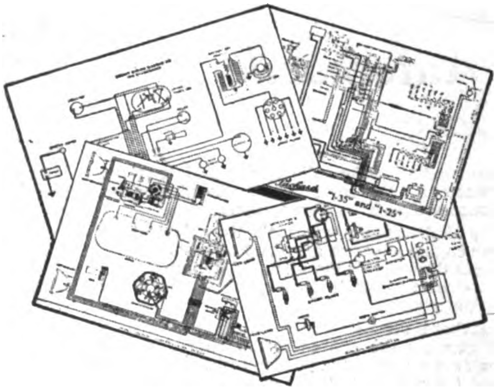

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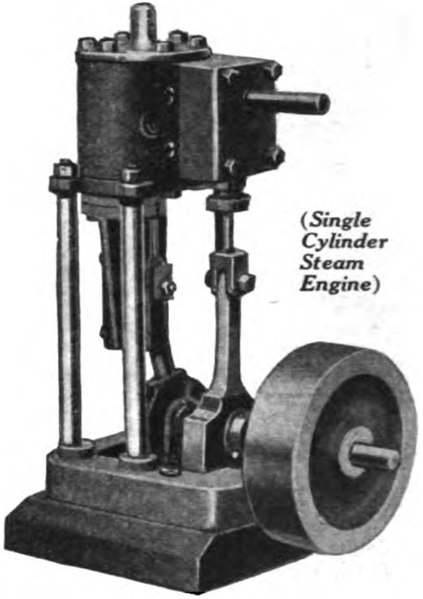

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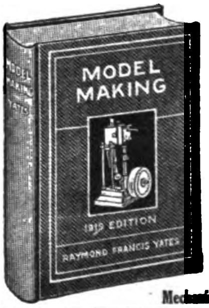

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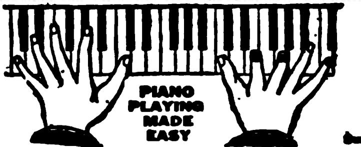

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To use it, stand in front of a mirror, if necessary, and use the UTILITY TRIMMER like you would a comb. Push it through the hair, downward, in the direction the hair lies, **but Never Upward.**

To cut long hair, first moisten the hair and comb it, so it will lie close to the head, then start cutting with downward cuts as high as you desire, evenly all around the head. Finish around the neck and temples with a square cut, like a barber.

It is impossible to leave any "nicks" or "cat steps" in your hair with this device, as the handle guard guides the cutter blade evenly over the scalp.

To cut very close, push the blade until the cutting edge is even with the guard teeth.

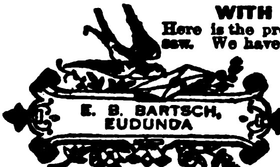
To shave the face or neck it can be used as an ordinary razor by reversing the blade in the holder, the cutting edge being to the back of the holder, exposing the entire blade, except each corner.

To hone, place the blade in the holder, with the cutting edge to the back, moving the blade out until the cutting edge is clear of the back of the holder. Then hone in the usual manner; finish on a strop as with an ordinary razor.

JOHNSON SMITH & CO., Dept. PM7, 3224 N. Halsted St., Chicago

THIS PRETTY RUBBER STAMP

WITH PAD AND INK, 75c



Here is the prettiest rubber stamp you ever saw. We have had this design specially engraved for our customers, and it cannot be obtained except through us. The design is ornamental, with floral decorations with a beautiful dove in the upper part conveying its message of love, the desired name or name and address being tastefully displayed in the center. With this rubber stamp you can brand your letter paper, envelopes, postals and other stationery, and the elaborate and unique design will be admired by all. Placed upon the outside of envelopes, packages and other mail matter, it ensures their return to the sender in the event of non-delivery for any reason. It looks very pretty stamped on books, music, photographs, etc. With each stamp we include a self-inking stamp pad and a bottle of ink for re-inking the pad, and the PRICE of the COMPLETE OUTFIT is ONLY 75 CENTS, POSTPAID. J. S. & CO., Dept.PM7, 3224 N. Halsted St., Chicago

MIDGET BIBLE

The Smallest Bible in the World

The Midget Bible is a perfect gem, and a work of art. It is about the size of a postage stamp and contains TWO HUNDRED PAGES of the NEW TESTAMENT. This little Bible is a wonder. It is said to bring good luck to the owner. Must be seen to be appreciated. **Price, only 12 cents, three Bibles for 30 cents; one dozen Bibles for $1.00 or 100 for $6.00.** Good money can be made selling these Midget Bibles amongst friends, church acquaintances, Sunday schools, bazaars, etc. Send for a few and try it.

JOHNSON SMITH & CO., Dept. PM7, 3224 North Halsted Street, CHICAGO

WONDERFUL X-RAY TUBE

A wonderful little instrument producing optical illusions both surprising and startling. With it you can see what is apparently the bones of your fingers, the lead in a lead pencil, the interior opening in a pipe stem, and many other similar illusions. A mystery that no one has been able to satisfactorily explain. Price **10** cents; **3** for **25** cents; **1** dozen, **75** cents.

JOHNSON SMITH & CO.

STAGE MONEY

With a bunch of these bills, it is easy for each person of limited means to appear prosperous. By flashing a roll of these bills at the proper time and peeling off a genuine bill or two from the outside of the roll, the effect created will be found to be all that can be desired. **Prices, postpaid: 15 Bills 10c, 50 Bills 25c, 125 for 50c, or $3.50 thousand.**

NEW BOOK ON ROPE SPLICING

USEFUL KNOTS, HITCHES, SPLICES, ETC.

PRICE 20c

How Different Knots Are Made and What They Are Used For. Knots to Use and Knots to Avoid.

A most practical handbook giving complete and simple direction for making all the most useful knots, hitches, rigging, splices, etc. Over 100 illustrations. All about wire rope attachments, lashing, blocks, tackles, etc. 37 Heraldic Knots illustrated. Of great value to mechanics, riggers, campers, boatmen. Price 20c p. pd.

J. S. & Co., Dept.PM7, 3224 N. Halsted St., Chicago

MUSICAL KAZOO

With the Musical **Kazoo** you can, without previous practice whatsoever, play any tune right off, imitate any bird or animal, bagpipe, snare drum, Punch and Judy, etc. No holes to finger. It is simplicity itself. Produces excellent music. You do not blow into it, but sing, speak, laugh or make any desired imitation. Used with astonishing results at society meetings, home, club or church entertainments, dances, serenades, picnics, outings, excursions. Just the thing for choruses and shows, bicycle and marching clubs, etc. Excellent for vocal or instrumental accompaniments, either with or without other musical instruments. **Price 15c p. pd.**

Mystic Skeleton

10c ppd.

A jointed figure of a skeleton 14 in. in height, will dance to music and perform various gyrations and movements while the operator may be some distance from it.

Serpent's Eggs

Box contains 12 eggs. When lit with a match, each one gradually hatches itself into a snake several feet long, which curls and twists about in a most lifelike manner. **Price per box, 10c ppd.**

JOHNSON SMITH & CO., Dept. PM7, 3224 North Halsted Street, CHICAGO

All the Latest Surprising and Joke Novelties

Pharo's Serpents Eggs, box	10c	Mesmerized Penny (defies the law of gravitation)	20c
Miniature Water Pistol	10c	Mysterious Tumbler and Vanishing Coin Trick	25c
Cleopatra's Snake (very lifelike)	15c	Magic Mirror (take one peep)	10c
False Mustache (fool your friends)	6c	Magic Plate Lifter	20c
Automobile Puzzle (Latest)	20c	Imitation Gold Teeth	3 for 10c
Mysterious Ghost, shines at night	10c	Great Burglar Puzzle	15c
Great Palming Coin Trick	25c	Wire Puzzles, 10c. 22 different,	$1.95
Rubber Dagger (sensational)	20c	"Elec-Trick" Push Button	10c
Window Smashers (great joke)	25c	Inkless Pen (writes with water)	10c
Lookbackoscope (see behind you)	15c	Imitation Bed Bugs	10c
Great Mind Reading Mystery Cds.	10c	Squirt Ring	20c
Thurston's Mysterious Trick Cds.	10c	Trick Bill Book	10c
Liars License	10c	Acquaintance Cards (witty and amusing)	10c
Cover the Spot Trick, a scien. nov.	10c	Glass Watch	25c
X Ray Novelty	10c	Multiplying Billiard Ball Trick	25c
Trick Pencil	10c		
Rubber Tacks (a good joke)	10c		

JOHNSON SMITH & CO., Dept. PM7, 3224 North Halsted Street, CHICAGO

Save
TIRES LIKE THESE

I Earned $2200 IN Four Months

This is Richard A. Oldham

Mr. Oldham was telegraph operator for the Illinois Central Railroad for twenty years. He is fifty-eight years old. One day he read one of my advertisements and the possibilities of making money in the Auto Tire Surgery Business. In a few weeks he had purchased and installed a Haywood outfit. A short time afterward he wrote us that his income in four months was as much as it had been in Two and One-Half years as Telegraph Operator.

Earns $800 Month

This is E. T. Buchmann

He is a Tire Surgeon at 4903 N. Clark St., Chicago. He says: "Am earning $800.00 per month, and confining myself solely to re-building of Tires by Haywood Method."

Be a TIRE SURGEON

Make $2,500 to $4,000 Per Year Giving New Life to Old Tires.

It **is** being done—by the wonderful new Haywood Method of Tire Surgery. It is one of the great results of the war. A Haywood Tire Surgeon can do more with old tires than was even dreamed of before the war. By the **Haywood Method a Haywood Tire Surgeon** can give 4,000 to 5,000 more miles of new life to a tire, that two years ago would have been thrown on the junk pile. As a surgeon saves human lives by his operations, so by **Haywood Tire Surgery**, you can save and lengthen the life of old tires. And it's easy to learn.

HAYWOOD'S TIRE SURGERY

Stations Are Needed Everywhere

20,000,000 tires wearing down every day. By Tire Surgery, you can quickly repair, rebuild and give new life to tires seemingly all worn out. Cuts, gashes, tears, bruises, broken fabric, every kind of an accident that can happen to **any** tire, inside or out, you can repair and save for long service. **The chance to make money is simply wonderful.**

$2,500 to $4,000 A YEAR Is Possible

During the war the nation needed an unusual service to keep the thousands of automobiles, ambulances and aeroplanes going day and night. **HAYWOOD TIRE SURGERY** met the demand.

If we told you all the truth you wouldn't believe it. You would say, "it is too good to be true". But you can see what a great field there is for **Haywood Tire Surgery Stations**—for this better way. You have eyes. You see why there **must** be wonderful chances to make money. But to see—to know—is **not enough.** It is **action—decision** that counts these days. The man who waits, gets lost in the shuffle. **It is the resolute will to follow your hunch that lands** you where the money is.

WITH THIS HAYWOOD OUTFIT

WRITE TODAY

M. HAYWOOD, President
Haywood Tire & Equipment Co.
973 Capitol Ave., Indianapolis, Ind.

DEAR SIR: Please send me by return mail your free book on the new Haywood Tire Surgery Method and the details of your free school of tire repairing.

Name..

Address..

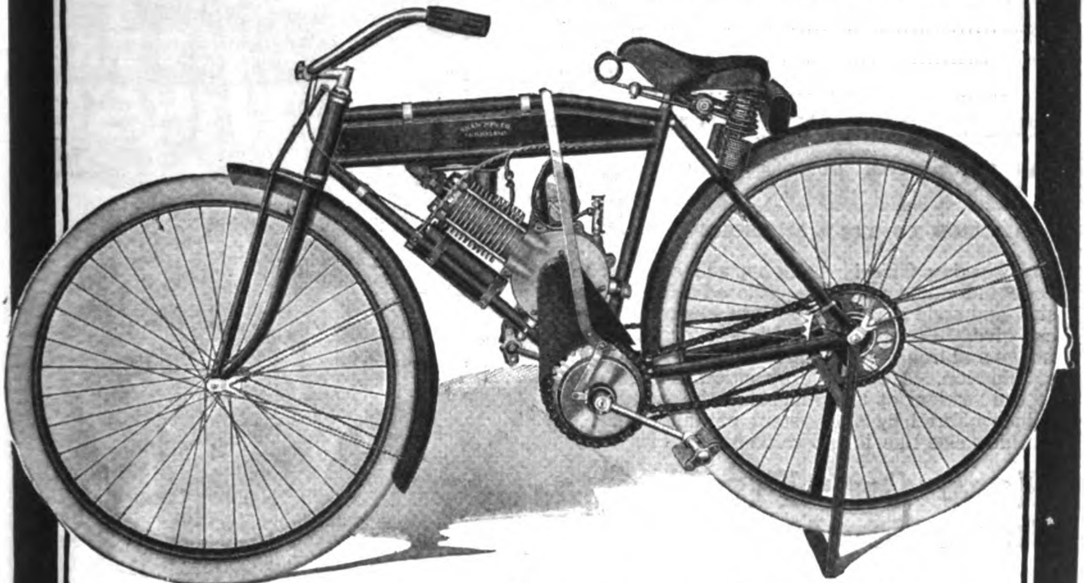
....

Send Today For My Free Book

I have ready to mail you the day I get your request, a fascinating book—all about tires—how to repair them by the Haywood Method—how to start in business—how to build up trade—what to charge. You needn't write a letter—just tear out the coupon right now, fill it in and mail. In 48 to 72 hours you can have the whole proposition right in front of you. It's a case of walking right into $2500 to $4000 a year and up. Use coupon at the left.

M. HAYWOOD, Pres.
Haywood Tire & Equipment Co.
973 Capitol Avenue Indianapolis, Indiana

The SHAW MOTORBICYCLE



A Superior, Easy-Running, Dependable Power Bike at Low Cost

There is no need to pay a high price for a dependable motorcycle now. There is no need for you to be without a power machine that will take you over the hills. Here's your opportunity to save from one-third to one-half and own a Motorbicycle that will surprise you with its power, low up-keep and ever-ready service.

The SHAW MOTORBICYCLE is the most economical way of motoring. It is a strong, specially designed bicycle, made of heavy gauge tubing, fitted with strong wheels and large, rugged tires. Equipped with a 2½ h. p. motor. Has chain drive with free engine clutch. It is lighter, more attractive, easier to handle and less expensive to operate than a motorcycle, as shown by the following facts :

90 to 125 miles per gallon of gasoline
1200 to 1800 miles per gallon of cylinder oil
8000 to 12,000 miles per set of tires

Special motor, built in our own factory, under rigid inspection. Very compact. All parts easy to get at. High tension magneto. Famous breeze carburetor. Automatic lubrication. Entire control extremely simple and efficient.

We also manufacture the Shaw Attachable Motor Outfit which converts a common bicycle (with single or double bar) into a reliable motorcycle. The Shaw is so designed that it can be quickly attached to any bicycle without the aid of mechanic or special tools. Thousands in use in U. S. and foreign countries.

Write At Once** For Full Particulars **Free!

Shaw Manufacturing Co.
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GALESBURG,
KANSAS

SHAW MANUFACTURING CO.
Dept. 303, Galesburg, Kansas

Send me full information about the Shaw Motorbicycle and Shaw Attachment, without obligation on my part.

Name..

Address..

Bernard-Hewitt & Co., Desk H-26
424-434 So. Green St., Chicago, Ill.

Please send me your new men's wear Spring and Summer style book with samples of latest woolens and full details of your plan.

Name...

Address...

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MAIL THIS COUPON

Save Money on Everything You Wear

Samples FREE

This $27.50 Suit $17.50

TAILORED TO YOUR MEASURE

An Amazing Offer! A high-grade suit cut to your individual measure—tailored with all the skill and style that only the best custom tailors can give. Finished with highest grade trimmings and linings—the kind that wear and give satisfaction. A special proposition to introduce to the readers of this magazine the wonderful values offered by our system of tailoring. Nothing else like it—no value to equal it.

We pay shipping charges

How Our Plan Saves You Money

We have no agents, no dealers, no traveling salesmen. Our catalog is our only representative. Actual comparison will show that our plan saves $10 or more on every suit and gives you real individuality in your dress—clothes that are tailored to fit you and you alone—reflect your personal tastes. Our line includes a wonderful selection of fancy wool worsteds, cassimeres and all-wool **blue serges, at unheard-of low prices.**

Send Only $3.00

and your measurements, with cloth selection made from our catalog. We will make the suit to your measurements and you pay balance on arrival—we paying all transportation charges. So confident are we that we can please you that all we ask is that you make a trial of our system; that you learn how easy it is to take your own measure and save money on every suit. We take all the risk, you none, for this is our

GUARANTEE:

Complete satisfaction or all money refunded.

You must be pleased in every particular—in fit—in style—in workmanship and materials, or we don't want your money. Could anything be fairer? Write today—wear tailor-made clothes of exceptional style and value—dress better and save money.

$17.50

Catalog Free

Our big, new Spring and Summer book is ready for you—contains samples latest woolens—also lowest prices on men's hats, shoes and furnishings. It is your guide to correct and economical clothes buying. Mail coupon above or write, mentioning this publication so we can identify this special offer.

From the Catalog

COLLARS

Six for 75c

Four ply, hand laundered stiff or soft collars, 21 different styles to select from, selling everywhere now at 25c each. We sell them at **6 for 75c.** In ordering be sure to state size number and style desired.

From the Catalog

NECKTIES

Large Four-in-hands, 3 for $1.00

Large imperial shape, flare end four-in-hand ties, beautiful striped effects, and flowered patterns, hundreds of regular 50c and 75c values **Three for $1.00** Try Three. State color desired.

From the Catalog

SHIRTS

Satin Stripe Shirts 3 for $4.50

Guaranteed $2.00 shirts, latest effects in broad satin or silk stripes, coat front, soft turn-back cuffs, hand-laundered body. **Try three at our low price, 3 for $4.50.** State size of neckband when ordering. Choice of black, blue and lavender stripes.

From the Catalog

GARTERS

Men's pad garters, best known standard make, made so no metal can touch you.

25c single grip pad garters - - - - -	19c
50c single grip pad garters - - - - -	39c
35c double grip pad garters - - - - -	21c
50c double grip pad garters - - - - -	43c

All colors to select from.

BERNARD-HEWITT & CO

424-434 S. Green St., Desk H-26 Chicago, Ill.

I Will Save You MONEY ☛ Read My Special Offer

President
Alonzo S. Thomas,
Santa Fe Watch Co.

To Readers of Popular Mechanics:

My sole aim, during the year 1919, shall be to place as many standard, dependable Watches as I can in the hands of men throughout the land, REGARDLESS of PRICE or PROFIT. To do this I have CUT the PRICE to ABSOLUTELY ROCK BOTTOM. I know that if I can distribute 5,000 "Santa Fe Specials" this year on this NO-PROFIT PLAN, that every Watch will be a salesman and sell at least one more. I am making this STARTLING AND UNHEARD OF OFFER to those who will tell their friends of this remarkable Watch value, if they find the Watches all and more than I claim for them.

Signed, Alonzo S. Thomas

Pres. Santa Fe Watch Co.

Buy Your Watch NOW!

21 Perfect Jewels
Adjusted to Positions
Adjusted to Isochronism
Adjusted to Temperature
3-Color Inlay Cases
New Designs

BIG WATCH VALUE

The ILLINOIS Famous Santa Fe Special 21 JEWEL RAILROAD WATCH $2.50 A MONTH

The Standard Railroad watch that is GUARANTEED FOR LIFE. These watches are NOW in the service on practically every Railroad in the United States. "Santa Fe Special" watches are in every branch of the Army and Naval Service. Thousands of them are distributed all over the world. They are GUARANTEED ABSOLUTELY, TO GIVE SATISFACTION IN EVERY WAY OR MONEY BACK.

The wise man will act quickly if he wants a watch. Write today for the FREE watch book and make your selection quickly, before this offer is withdrawn.

Save $\frac{1}{3}$ to $\frac{1}{2}$ of Your Money

Most Liberal Offer Ever Made

Our "Direct-to-You" low wholesale terms and EXTRA SPECIAL DISTRIBUTION PLAN is fully explained in the NEW Santa Fe Special booklet just off the press. The "Santa Fe Special Plan" means a BIG SAVING of money to you and you get the BEST watch value on the market today. WATCH SENT FOR YOU TO SEE WITHOUT ONE PENNY DOWN.

New Case Designs The new watch book shows all the very latest designs of the world's most talented engravers, each case illustrated in beautiful color combinations, showing three-color INLAY MONOGRAMS, ENGRAVED MONOGRAMS, fraternity emblems, French art and special designs.

Right NOW as other manufacturers are advancing prices on watches we are slashing **OUR PRICES** to **absolute rock-bottom.** WE ARE FORCING WATCH PRICES DOWN. We can do this simply by sacrificing profits.

A postal, letter or the coupon brings the new watch book.

Santa Fe Watch Company

66 Thomas Bldg., TOPEKA, KANSAS

Home of the Great Santa Fe Railway

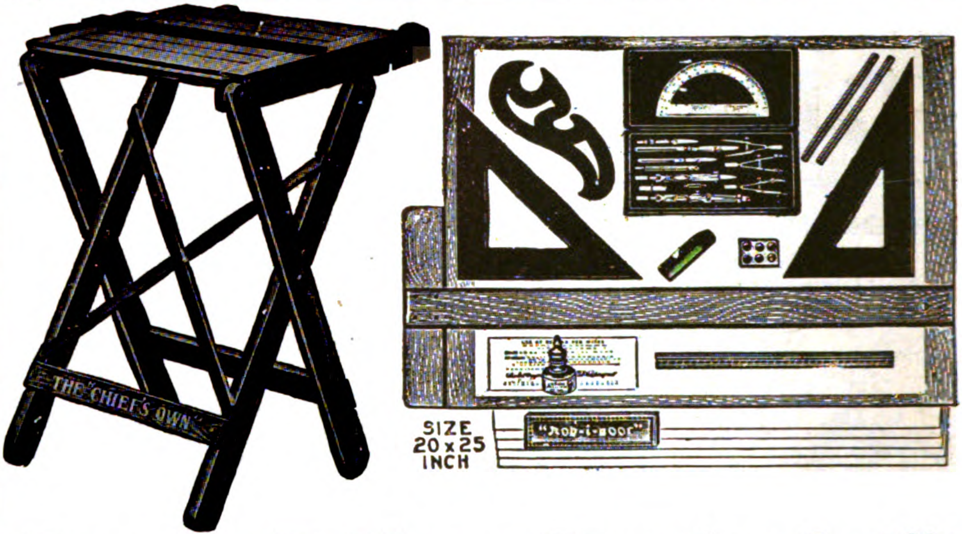
A letter, a postal or this coupon will bring this Free Watch Book

SANTA FE WATCH CO., 66 Thomas Bldg., Topeka, Kansas

Please send me the New Watch Book with the understanding that this request does not obligate me in any way.

Name..

Address..State..............



Drawing Table and Drawing Outfit

FREE

I'LL give you this handsome set of drawing instruments in a plush lined folding case—a 20x25-inch drawing board, a 24-inch T square, a 12-inch rule, a supply of drawing paper, two triangles, a French curve, pencils, erasures, thumb tacks and the "Chief's Own" adjustable, folding drawing table. Yes, I give it to you absolutely free. It's an outfit that you couldn't duplicate for less than $20 or $25. Just the kind of an outfit used by the higher paid draftsmen. And I give it to you free the day you start getting the training for that $200 job.

I'll Train You for a $200 Job

Be a draftsman. There is an urgent demand for skilled draftsmen. Companies are issuing calls every day for men to fill positions that pay from $175 to $200 a month. I am chief draftsman of a large and well known firm. I have been doing the highest paid drafting work for a quarter of a century. I know just the things that you must know in order to hold a responsible, high paid position. **And I will train you during your spare time.** You will receive my personal attention from the day you start until the time you are qualified to fill a high paid position. Go just as fast or just as slowly as you please. My offer to you is to train you **until you can hold a big, straight salary—$200 a month position.**

I'll Help You Get a Job

Furthermore, after you have completed the training I'll do my best to start you to work as a high-class, high salaried draftsman. I know what the big companies are demanding. I know chief draftsmen in other big companies all over America, and they all know that the men I have trained are qualified to do any kind of draftsmen's work, and I'll write to them personally, if necessary, to help you get a job. Draftsmen are needed in all parts of the country and probably you will be working as a high salaried draftsman long before I am all through with your training.

Chief Draftsman Dobe
Engineer's Equipment Company, Inc.
Div. A919, Chicago, Ill.

Without any obligation on me whatsoever, please mail your book, "Successful Draftsmanship," and full particulars of your liberal "Personal Instruction" offer to a few students. It is understood that I am obligated in no way whatever.

Name..

Address..

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Send Me the Coupon Now

If you'll send me the coupon today I'll send you a book that has meant dollars to hundreds of men. I call it "Successful Draftsmanship." It tells about the drafting profession and the opportunities that exist today. It contains concrete facts and figures from cover to cover. It tells about the need for men and shows samples of actual work done and explains the value of practical training and practical experience. You will be under no obligation in sending for this book. Merely put your name and address on the coupon and send it now.

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Jobs Requiring No Special Training Pay from $12 to $25 a Week and Offer No Future

The Expert Electrician Earns from $46 to $100 a Week and is Always in Line for the Big Jobs

ELECTRICITY-L·L·COOKE-SUCCESS
I TEACH ELECTRICITY. LET ME MAKE YOU A SUCCESS

Be a Certificated Electrician!

Electricity is to-day lighting and moving the world. It is calling for experts in this business and offers you a bigger success than any other profession. Go after some real money. Qualify for one of the thousands of splendid positions open. All you need to start is a few months' snappy, **practical** instruction from a competent Engineer. Come with me—**NOW.** I'll give you my personal care to ensure rapid and efficient progress. My course is intensely practical. It is highly condensed, simplified, up-to-date and complete.

SATISFACTION GUARANTEED

I am so sure you will make a splendid success in this study, that I will **Guarantee Under Bond** to return to you every cent paid for tuition, if you are not entirely satisfied when you receive your Electrician's Certificate granted you as a graduate of my school.

Prepare yourself for a real position, by my **Home Study Course** in **Practical** Electricity. I am Chief Engineer of the Chicago Engineering Works. I have trained thousands of men and can help you better than anybody else. We also have large, splendidly equipped shops where you can come at any time for special instruction without charge. No other correspondence school can give you this.

FREE—LESSONS AND OUTFIT

Send me the Free Outfit Coupon at once. Do it **now**! For a limited period I am making a slashing cut in the cost of tuition, and giving each new student a grand outfit of Electrical Tools, Material and Instruments—in addition—**Absolutely Free.** I will also send you—free and fully prepaid—Proof Lessons to show you how easily you can be trained at home to enter this great profession, by means of my new, revised and original system of mail instruction.

WRITE NOW — DON'T DELAY ☛

Delay never got you anything. Action is what counts. Get started—and get started now. Write for my big new book—"How to Become an Electrical Expert."

L. L. COOKE, *Chief Engineer*

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Chief Engineer Cooke, Dept. 16, 441 Cass St., Chicago, Ill.

SIR: Send at once—fully prepaid and entirely free—complete particulars of your great offer for this month.

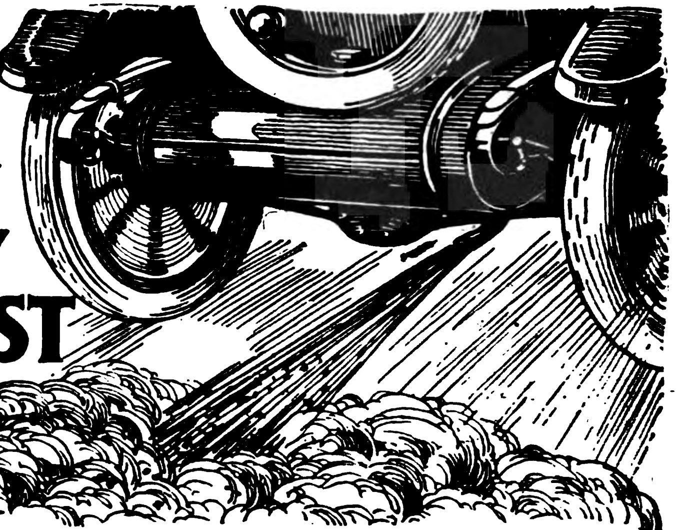
Name..............................

Address..............................

City..............................

State..............................

REMOVE CARBON THE EASY WAY=OUT THE EXHAUST



THE easiest, cleanest, safest and most satisfactory method of removing carbon deposits is with Johnson's Carbon Remover. It will save you from $3.00 to $5.00 over any other method without laying up your car and with much better results. After one application your car will run like it did the first 500 miles—quietly and full of "pep"—and you will secure the maximum power and speed from the minimum amount of fuel.

Johnson's Carbon Remover is a harmless liquid to be poured or squirted into the cylinders. It contains no acids and does not affect lubrication or interfere with the oil in the crank case. Millions of cans have been used. Recommended by many of the leading car Mfrs. including the Packard and Studebaker Companies.

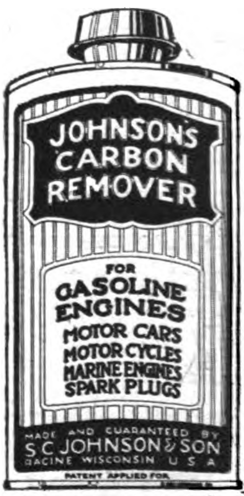
JOHNSON'S CARBON REMOVER

A dose of Johnson's Carbon Remover—the engine laxative—will cure 80% of engine troubles. It will increase the power of your car—improve acceleration—stop that knock—quiet your motor—save your batteries—cut down your repair bills—and reduce your gas and oil consumption.

Don't wait until your motor is choked with carbon—remove it every week or two with Johnson's Carbon Remover. You can do it yourself in five minutes—no mechanical experience necessary.

The regular use of Johnson's Guaranteed Carbon Remover will automatically eliminate most valve trouble and keep your motor clean, sweet and at its highest efficiency.

For sale by Hardware, Accessory dealers and Garages. Send for our booklet on Keeping Cars Young—it's free.



S. C. JOHNSON & SON, Dept. PM6 **Racine, Wis.**
Established 1882

A New $100 Oliver
Latest Model—for Only
$57

We Ship It to You for Free Trial. You Can Decide After Trying It

We offer here our identical Model No. 9, formerly priced at $100. Not a single change has been made in its design or materials. Only our plan of selling has changed. New economies made possible through wartime methods enable us to save you the $43 it used to cost us to sell you an Oliver. If any typewriter is worth $100 it is this splendid, speedy Oliver.

You may order direct by mailing the coupon below. We ship the Oliver to you for free trial. You can then judge it yourself. You can compare its workmanship. At no time during the trial are you under obligation to buy. You can keep it or return it. No eager salesman need influence you. The Oliver must convince through merit alone.

Only $3 Per Month Pays for It

If, after trial, you agree that the Oliver is the finest typewriter, regardless of price, and you want to own it, merely pay us $3 per month until the $57 is paid. This is like renting it, yet you own it before you realize it. If you want to return it, ship it back express collect. We even refund the outgoing transportation charges.

We are able to make this unlimited free trial offer because of the Oliver's ability to prove its own case. Everyone appreciates the saving and the easy payment plan.

Over 700,000 Olivers have been sold. There are satisfied users everywhere.

Mail the coupon now for your Free Trial Oliver or further information.

Canadian Price, $72

THE OLIVER TYPEWRITER COMPANY
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Chicago, Ill.

(102.03)

Save $43 This Easy Way

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1096 Oliver Typewriter Building, Chicago, Ill.

☐ Ship me a new Oliver Nine for five days free inspection. If I keep it, I will pay $57 at the rate of $3 per month. The title to remain in you until fully paid for.

My shipping point is ....
This does not place me under any obligation to buy. If I choose to return the Oliver, I will ship it back at your expense at the end of 5 days.

☐ Do not send a machine until I order it. Mail me your book—"The High Cost of Typewriters—The Reason and the Remedy," your de luxe catalog and further information.

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City .... State ....

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MEAD CYCLE CO. BICYCLES REPAIR PARTS TIRES CHICAGO U.S.A.
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You Can Now Buy Direct From Our Factory At Wholesale Prices-

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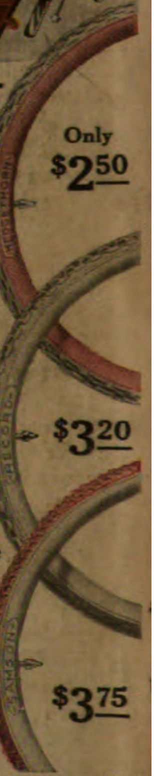

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